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EXPANDING UNDERSTANDING OF PUBLIC POLICY AS
A COMPLEX AND PLURI-DISCIPLINARY SYSTEM:
ILLUSTRATING POSSIBILITIES OF EPISTEMIC PLURALISM

A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy at Virginia Commonwealth University

by

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Acknowledgement

This work is for the family who brought me into this world and for the family who sustains me today, held together as we are through a Wittgensteinian Family Resemblance.

It is dedicated with profound thanks and gratitude to S.P, D.F., R.H., and G.J.

Preliminary Descriptive Outline of Dissertation

Part I Introduction

The section introduces the study by providing background and need for the research. The research question is: What is the relevance of understanding and explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? This section answers questions, such as, why does it matter and why is this important? (Chapter 1)

Part II Conceptual/Textual Underpinnings

This section discusses essential elements of the conceptual and textual underpinnings of the research. It lays the groundwork for the research to come. References to the literature will involve more than a discrete literature review. In research involving analysis of texts, such as this one, literature may not be confined to a single chapter but may instead be “integrated” throughout the dissertation (Ridley, 2012, p. 6). (Chapter 2)

Part III Research Methods

This section will set forth the methodology used to answer the research question. It sets forth interpretivist methods to achieve the specific aims. Interpretivist methods in this case are a modified hermeneutic circle approach. The modification involves analytical techniques including textual analysis, setting forth the parameters of a gaming algorithm, and agent-based modeling. (Chapter 3)

Part IV Analysis

This section will examine both the narrative of the conscious, achieving explicit analytical understanding and results through completing a modified hermeneutic circle, and the narrative of the unconscious, what underlies so-called explicit understanding. It

will identify the opportunities and constraints for the practical application of epistemic pluralism in its big data context and for upgrading public policy and administration.

(Chapter 4 and Chapter 5)

Part V Practical Application

This section will extend electronic governmentality initiatives in public policy and administration beyond specific policy domains and toward a more comprehensive approach. What is cloud-based public policy and administration? What current technology exists to facilitate learning? How can decision-making be reimaged to facilitate creation of a tool that incorporates, absorbs, and merges with science as newly understood? Finally, this chapter uses mathematics to demonstrate that epistemic pluralism expands understanding. It calls for further research into epistemic pluralism as the analogue to time dilation in theoretical physics. (Chapter 6)

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Abstract

EXPANDING UNDERSTANDING OF PUBLIC POLICY AS A COMPLEX AND PLURI-DISCIPLINARY SYSTEM: ILLUSTRATING POSSIBILITIES OF EPISTEMIC PLURALISM

By Cynthia Sue Cors, PhD

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2014.

Major Director: David John Farmer, PhD, Professor of Philosophy and Public Affairs, L. Douglas Wilder School of Government and Public Affairs

Science, and especially the social sciences, has developed as distinct territories, each with its own vocabulary and language-game (Wittgenstein, 1945/1958). Yet understanding and explaining science as a complex and pluri-disciplinary system has important practitioner-oriented as well as research-oriented and other benefits, benefits that can be enhanced through the use of cloud-based technologies.

Understanding and explaining public policy in particular as complex can inform and transform the way problems are approached. This is particularly important for an action subject like public policy and administration that can be considered as having been influenced by many disciplines. Public administration (PA) through multiple perspectives, already in the literature as epistemic pluralism (Farmer, 2010), aims to transform PA's language-game by increasing the imaginative nature of knowledge.

The practical application of epistemic pluralism has also been established. This dissertation further extends theory to practice by conceptualizing a cloud-based tool called Wittgenstein X. A cloud-based tool to organize and make sense of public policy and administration through multiple perspectives will provide a mechanism for researchers, practitioners, students, and others to increase the imaginative nature of knowledge. The application of EP theory and practice to big data will also be considered. This dissertation conceptualizes complexity theory as the fundamental vantage point from which science in general and public policy and administration in particular can be understood. It asks: What is the relevance of understanding and explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? This study is important because it offers a remedy to resolving seemingly intractable problems in PPA. The component terms of this study, science, complexity, pluri-disciplinarity, systems, and governmentality will be shown as linked in a Wittgensteinian Family Resemblance. The terms can be said to merge into a whole where the whole is greater than the sum of the parts.

Key words: big data; complexity theory; decision sciences; electronic governmentality; epistemic pluralism; experiment/theoretical treatment; health policy; philosophy of public policy; public policy and administration

CHAPTER 1

EXPANDING UNDERSTANDING AND ILLUSTRATING POSSIBILITIES

In this dissertation, I will show that epistemic pluralism offers a valuable link between theory and theory, theory and practice, and practice and practice. Viewing issues through multiple perspectives expands understanding by extending public policy and administration (PPA) decision-making from a one-best-choice optimization problem, viewed through rationality, to a problem with multiple optimal solutions. Epistemic pluralism is viewed as the way to get from A, the one-best-choice, to Z, multiple choices. Expanded understanding will be illustrated mathematically using calculus. Epistemic pluralism will also be shown to have roots in language-games as theorized by Ludwig Wittgenstein, and to have multiple components. One such component examined will be the biopsychosocial and spiritual model. Also known as the BPSS model, it suggests there are at least four elements of human activity or being: biological, psychological, social, and spiritual or poetic. These factors work alone and in complex ways; they cannot be adequately understood by their reductionist components. Just as every individual is the product of a combination of factors so too are the public policymakers and practitioners operating in the context of their BPSS environment. In the so-called DNA of epistemic pluralism, BPSS, is a part. Other parts of epistemic pluralism include imagination, deconstruction, deterritorialization, and alterity. These will be examined in their big data context and implications for public policy and administration will be discussed. The complexity of epistemic pluralism extends to the

cloud where new and creative ways of solving public policy problems are emergent and based on mutual adaptation. Finally, epistemic pluralism will be proposed theoretically as the analogue to time dilation in theoretical physics. Whereas time is shown to actually expand in time dilation, epistemic pluralism can also expand understanding of PPA problems.

What does epistemic pluralism have to do with big data? Epistemic pluralism is a grand strategy for viewing through multiple perspectives (Farmer, 2010, 2012b). It can also be described as a complex and pluri-disciplinary system (Farmer, 2012a).

Complexity in broad terms means a way of understanding science as a whole rather than the reductionist components of science. Big data is defined sometimes by the size of a dataset and other times by the context in which the data are collected and stored (Executive Office of the President, 2014). As will be seen in Chapter 5, epistemic pluralism can provide value to policymakers and others who are creating big data policies. By viewing big data issues through multiple perspectives, new understandings can be illuminated, understandings that can inform public policy.

This dissertation contributes to understandings about method, understandings about substance, and understandings about method and substance. In terms of understandings about method, this dissertation: 1) utilizes a hermeneutic approach that incorporates the language of mathematics, 2) finds that study terms are held together by a Wittgensteinian Family Resemblance, 3) shows that quantitative text analysis tends to lose context-sensitivity, 4) demonstrates the complexity of agent-based modeling, 5) suggests that complexity science should work to avoid the gravitational pull of specialization, and 6) extends epistemic pluralism to the cloud with Variable Level Policy Modeling. Understandings about substance include: 1) a mathematical

demonstration that epistemic pluralism expands understanding, and 2) big data is a language-game. It is the use of big data, the activity of big data, which “defines” it. The central contribution to understandings of both method and substance is the illustration of big data as a language-game through the language of mathematics, computational modeling, and theoretical physics.

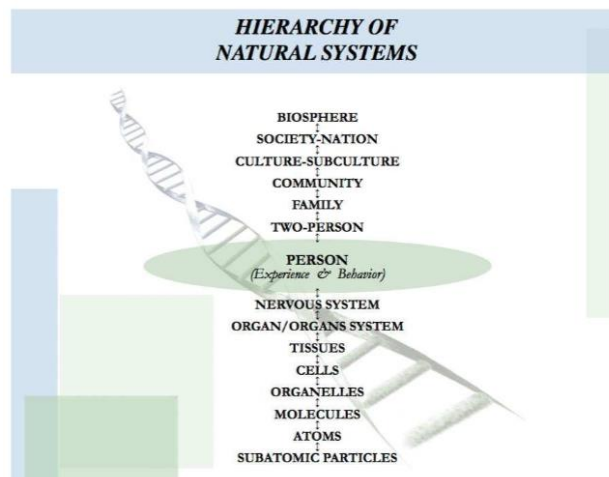
This chapter will explain the rationale for the research, define key terms, provide an overview of the research, and discuss the plan of the dissertation. I begin with a note about writing style. I will use primarily third person through Chapter 4. Beginning with Chapter 5, I will write in the first person. This is because Chapters 1 through 4 establish the framework for the research and describe the research results. Chapters 5 and 6 apply the results to a present policy question and recommend future areas of research.

Rationale

From the earliest days of the policy sciences, decisions about who gets what, when and how have been central. To paraphrase Harold Lasswell (1958), public policy is about *deciding* . . . “Who gets what, when and how” (title page). Decision-making, coordinating, and controlling have also been considered to be at the “heart of administration” (Simon, 1945/1997, p. xi) and these functions are optimized when practitioners have full information. Yet public policy and administration are not unique in having long-suffered from a *lack* of full information. Practitioners, believing they have the essential information needed to make a decision, consider the alternatives and take action; however, they often discover information post hoc that they wish had been known before making the original decision. They were operating under what can be called the Myth of Sufficient Information. The concept of decision-making under uncertainty implies the need for necessary and sufficient information to limit

uncertainty. And while there may be necessary and sufficient components that do limit uncertainty, there are also other limits inherent in the complexity of decision-making. These limits are BPSS in aspect, because decisions by humans necessarily include a BPSS aspect and these occur along a “continuum of natural systems” as shown in Figure 1.1 below (University of Rochester, 2014).

Figure 1.1 Hierarchy of Natural Systems.



Source: University of Rochester, 2014

Plato’s allegory of the cave perfectly describes how what is seen can be merely shadows of ourselves and artifacts around us (Plato, trans. 1974).

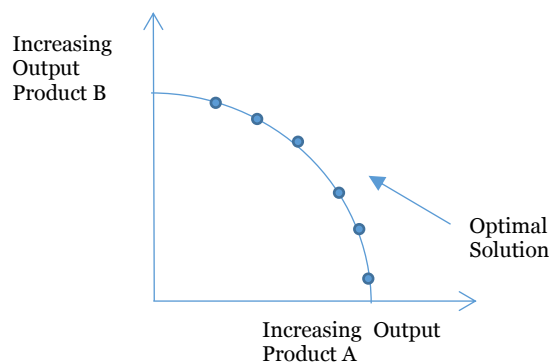
Do you think, in the first place, that such men [*sic*] could see anything of themselves and each other except the shadows which the fire casts upon the wall of the cave in front of them? . . . Altogether then, I said, such men [*sic*] would believe the truth to be nothing else than the shadows of the artifacts?” (Plato’s Republic, Lines 515c4 – 515c6, 515c1-515c2)

Similarly, practitioners may be limited by their organization’s historical treatment of a problem, by their own culture and experiences, by their training to view problems through rational perspectives, and by their language-game. Epistemic pluralism

embraces the complexity of public policy and administration and asks practitioners and others to recognize the multiple perspectives through which a problem can be viewed. It offers a way to accept and embrace the BPSS aspect inherent in decision-making. The risks of decision-making under uncertainty can be mitigated by viewing problems and issues through a multiplicity of perspectives. This dissertation envisions epistemic pluralism as the mechanism by which theory links with theory, theory links with practice, and practice links with practice.

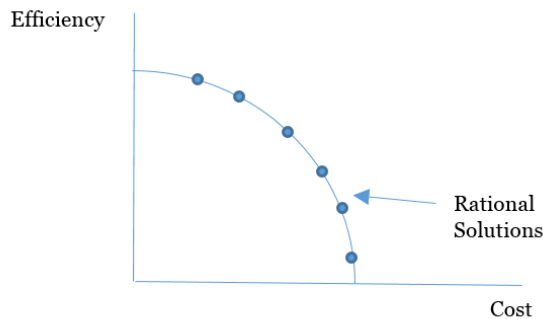
This research will demonstrate that epistemic pluralism is a mechanism that expands the frontier of PPA choices. In economics, this frontier is known as the production possibilities frontier. Figure 1.2 shows the production possibilities frontier (PPF) from the discipline of economics. The choice is between levels of production of two outputs based on the assumptions of a market economy, one of Mankiw's Ten Principles of Economics (Mankiw, 2011). Points on the curve represent efficient solutions, that is the solution maximized the production of each output relative to the other output. Under the market economy assumption, points inside the curve are inefficient and point outside of the curve are not possible.

Figure 1.2 Production Possibilities Frontier



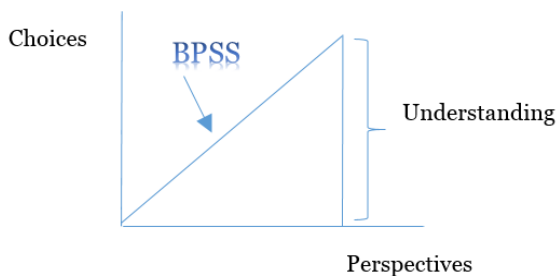
The production possibilities frontier can also be used to choose among competing policies, e.g., between raising the minimum wage or expanding government healthcare to people below the poverty level, or between cost and benefit tradeoffs of the same policy. Figure 1.3 shows the PPF in terms of PPA. This can be called the Frontier of Traditional PPA Thinking and Practice. Traditional PPA thinking and practice has been heavily influenced by the discipline of economics.

Figure 1.3 Frontier of Traditional PPA Thinking and Practice



The tradeoff in PPA is between cost and efficiency and it is most often seen in cost-benefit analyses (Kraft & Furlong, 2013). This work will show that epistemic pluralism is of catalytic value in expanding understanding of public policy and administration so that innovative and creative problem-solving can be achieved. This is illustrated in Figure 1.4, and will be pursued in the language of mathematics in Chapter 6.

Figure 1.4 Expanded Understanding through Multiple Perspectives



The primary purpose of this dissertation is to answer the question: What is the relevance of understanding and explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? In doing so it will translate theory to practice by developing a practical tool for use by practitioners, students, and others to transform PPA's language-game. *Theory* means macro public policy and administration theory. *Action* means a cloud-based tool for students, practitioners, and others to translate theory to action. The central aim of this dissertation is to contribute to new knowledge in the field of complexity science and specifically in (and as it relates to) the field of public policy and administration. The theoretical aim of this dissertation is to demonstrate that grounding public policy and administration in complexity theory will increase the creative and imaginative nature of knowledge. The practical aim is to develop parameters for a cloud-based tool for public policy and administration decision-making.

Definition of Terms

Science. Understanding science involves an appreciation of what science can and cannot answer, and recognition of limits to our understanding (Rosenberg, 2012). Understanding science can be an action or it can be vague and abstract. To understand something is to conceptualize it; to perceive it; to know its properties. Understanding can be in terms of “deeper understanding,” “act of understanding,” and understanding as in knowledge or “now I know” (Wittgenstein, 1945/1958, p. 250). Understanding filters through the conceptualizer's, the perceiver's, and the knower's web of meanings (Castoriadis, 1997).

Understanding can be contrasted with explaining. Explaining science is “identifying causes” (Hollis & Smith, 1990, p. 80). Explaining causes involves

identification of levels of analysis. According to Hollis and Smith (1990), explaining science has long involved neutrality and the creation of generalizations from observed phenomena.

Complexity. Complexity is, indeed, complex. And there are many ways complexity can be understood and explained. Complexity begins with science. Science has long been understood to be the study of parts, how parts evolve, what properties or attributes parts can be expected to have, and how the parts are expected to *behave*. Science has also been partitioned into parts. Certain sciences are “hard” sciences. Other sciences are social sciences. Complexity is the science of those parts as they are embedded in a collection of parts. Complexity finds order out of chaos; predictions out of randomness; behavior of a whole that is wholly different than the sum of its parts, and that cannot be reduced (Mitchell, 2009). According to Mitchell (2009), complexity is

an interdisciplinary field of research that seeks to explain how large numbers of relatively simple entities organize themselves, without the benefit of a controller, into a collective whole that creates patterns, uses information, and in some cases, evolves and learns. (p. 4)

Consider this example using the discipline of neuroscience. Neuroscience is the study of neurons or neurology and the way neurons behave. Combine neuroscience with economics and there is a new discipline: neuroeconomics. What predictions are unique to neuroeconomics that were not part of neuroscience or economics? It is complex.

Applications of complexity theory to public policy were the focus of a three-day workshop at the Organisation for Economic Co-operation and Development (OECD) in 2008. The report of the meeting from the OECD Global Science Forum, *Applications of*

Complexity Science for Public Policy: New Tools for Finding Unanticipated

Consequences and Unrealized Opportunities, describes a seminar that brought together scientists, decision-makers, and policymakers (Organisation for Economic Co-operation and Development, 2009). The intent of the meeting was to answer the question “How can the insights and methods of complexity science be applied to assist policymakers as they tackle difficult problems in policy areas such as health, environmental protection, economics, energy security, or public safety?” (OECD, 2009, p. 17).

In the United States, complexity theory is the research focus of institutions like the Santa Fe Institute. The Santa Fe Institute approaches the study of complexity from three “research themes: 1) Physics and Computation of Complex Systems, 2) Emergence Hierarchy, and Dynamics of Living Systems, and 3) Human Behavior, Institutions, and Social Systems” (Santa Fe Institute, 2014).

Pluri-disciplinarity. According to Farmer (1995), pluri-disciplinarity “is the juxtaposition of related disciplines” (p. 222). This can be taken to mean “multiplicities of differences” (Farmer, 1995, p. 226). Rather than seeking to unify science as operating under a distinct set of laws, pluri-disciplinarity accepts and recognizes differences while also recognizing that boundaries, if they exist, are fluid. Returning to the example of neuroscience, one set of propositions may apply to neuroscience, another set to economics, and a third set to neuroeconomics. Pluri-disciplinarity recognizes that the neuroscience perspective is important but the economic perspective and the neuroeconomic perspective are also important.

Epistemic pluralism. The term epistemic pluralism describes the idea of *knowing* and in more than one way or from more than one *perspective*. But it is more than that. Epistemic is the root of the term epistemology. Epistemology is the study of

ways of knowing. Pluralism means in more than one way. Combining the two terms into one gives a more robust definition than each word separately. Epistemic pluralism has been applied to finite subjects. For example, epistemic pluralism applied to economics questions neoliberalism as the one best way for a government to conduct business. Epistemic pluralism questions this and asks what can be learned from other economic ideologies? What lies underneath privileging neoliberalism? Is there a contrary? John Kay coined the term American Business Model (ABM) to describe a market economy that

believes that greed is the dominant human motivation in economic matters; that regulation of economic activity is mostly undesirable and should be minimized; that the economic role of the state should be limited and largely confined to the enforcement of contract and property rights; and that taxation should not rise above the levels needed to enable government to achieve these objectives and provide a modest welfare safety net. (Kay, 2004, p. 11)

He argues that such beliefs are unique to the United States. Just as persons have a BPSS aspect, the cultural aspect is present as well and finds its way into institutions. Kay maintains that it is the structure of economic institutions that determines “availability of resources, education, capital, and skills” (Kay, 2004, p. 30).

But epistemic pluralism need not be confined to interpretations of discrete subjects. One can also think of epistemic pluralism as a way to describe *becoming aware* of different perspectives, as a complex unfolding of what is to come. This unfolding can be the result of conscious effort as described later in Chapter 4 or the result of unconscious effort described in Chapter 5.

Cloud-based. What is cloud-based? Cloud-based is a term used to describe a platform for computer processing. Other platforms are mainframe, network, and personal computer (PC). A mainframe platform has applications and data storage on a mainframe. A network platform has applications and data storage on as few as two nodes, a PC and a server, or on multiple Internet servers. Internet servers are an extension of traditional networks in that they extend the network to the Internet. A PC platform is completely “local” meaning that all applications and data storage are on a single personal computer.

Cloud-based platforms use servers, they are distinct from a network, and applications and data storage are on the Internet. Applications are accessed through the Internet using a browser or Internet applications. Cloud-based can also be defined by what it is not. It is not local and it is not on its own network. Data storage is in the cloud. As an example, in the past Microsoft Office™ was available for installation only on a user’s hard drive or on a network of hard drives. MS Office became available in the cloud in 2011 (Motal, 2011). Consequently, purchasers of cloud-based MS Office do not install software locally or on their network but rather use MS Office virtually. An advantage of cloud-based services is they more easily facilitate sharing of documents or information.

It is worth noting that the above description of computer platforms describes platforms as if they are finite and distinct, however computer scientists do not all agree that each category is distinct from the others.

Electronic governmentality. Governmentality in public policy and administration can be understood using Michel Foucault’s construction of the term (Huff, 2006). Foucault wrote broadly about governmentality describing it as “techniques and procedures designed to direct the behaviour of men [*sic*]. Government

of children, government of souls or consciences, government of a household, of the state or of oneself” (Carrette, 2000, p. 154). Foucault used the term to describe how individuals “assume their subject positions” (Žižek, 1989, p. 174). Electronic governmentality refers to the digital form of governmentality. Technology is available to facilitate discussions between and among governmentality units, as the term is loosely defined, and even go beyond defined units to as yet undefined units.

Public policy and administration. What is public policy and administration? Public policy ultimately concerns deciding how to allocate resources. Implicit in this definition are values and beliefs regarding who gets what and who gets to decide who gets what. Public administration is the means through which agencies of governmentality implement solutions to government problems. Waldo (2007) describes students’ frustration with the emphasis on scientific management. Students are taught to privilege efficiency but other perspectives have been identified as worth considering (Farmer, 2010; Fischer, 1995; Schneider, 1997).

Research Overview

The goal of this research is to re-vision decision-making as necessarily encompassing multiple perspectives. In doing so, this research will extend theory to practice. Specific objectives are to:

1. Interpret and ground epistemic pluralism in complexity theory;
2. Set forth the theoretical basis for developing a detailed set of parameters for a cloud-based tool called Wittgenstein X; and
3. Demonstrate the wider application of Wittgenstein X as an electronic governmentality tool for transforming public policy and administration’s language-game, especially as applied to big data.

A note about the name Wittgenstein X. It is called Wittgenstein X after the philosopher, Ludwig Wittgenstein. Wittgenstein theorized that language-games operate as a system of interactions that are socially constrained (Kopytko, 2007). The purpose of Wittgenstein X as a practical tool is to remove barriers and lessen constraints to understanding, to the extent possible. The X is nomenclature for X=1, X=2, and X=3. In this case X=1 is envisioned as a cloud-based computer application to help students, researchers, and others apply epistemic pluralism to public policy and administration problems. The application of epistemic pluralism to all science and social action subjects is envisioned as X=2. The third level of Wittgenstein X is an application whereby practitioners develop implications of their own findings and share them with others.

General problem this research is addressing. The general problem this research is addressing is the tendency of policymakers and practitioners to approach problems as having one best solution, a solution achieved through rationality (Simon, 1945/1997) or to think from narrow disciplinary perspectives (Kraft & Furlong, 2013). Joseph Schumpeter wrote

The frontiers of the individual sciences . . . are incessantly shifting and . . . there is no point in trying to define them either by subject or by method. This applies particularly to economics, which is not a science in the sense in which acoustics is one, but rather an aggregation of ill-coordinated and overlapping fields of research in the same sense as is medicine. (Schumpeter, 1954, p. 10)

This research suggests that there may instead be a *solution set* of optimal decisions, a solution set identified through expanding the creative and imaginative nature of knowledge by utilizing pluri-disciplinary approaches. Expanding the imaginative nature

of knowledge can be achieved through application of epistemic pluralism. It will be demonstrated through development of an application called Wittgenstein X.

Rather than a single, optimal choice, achieved through rationality, decisions result in a solutions set of choices. The choices modeled are non-random but neither are they chosen systematically. In PPA there also exists a frontier of choices, seen as limited in traditional PPA thinking and practice, and shown earlier in Figure 1.3.

The major dimensions of this problem are that PPA is grounded in the view that science is about concrete answers; about there existing a single answer to a single problem; and about privileging efficiency over all other objectives (Fry & Raadschelders, 2013). Viewing problems through a single perspective is a problem in public policy and administration because it narrows the field of vision; it privileges one goal over other important goals; and it reinforces dominant views of science when alternative views offer new perspectives. Technology is also a dimension of the problem. Technology exists for practitioners to communicate with one another in ways only imagined a decade ago.

Previous research. Previous research has explained public administration in terms of complexity theory (Klijn, 2008; Morçöl, 2002); economics in terms of complexity theory (Arthur, 2013; Cassata & Marchionatti, 2011); and biology in terms of complexity theory (Mitchell, 2009). But while PA has been explained in terms of complexity theory, this construction is different. This research interprets epistemic pluralism as having a “catalytic value” (Cors, Lau, & Farmer, 2013; Farmer, 1995) as it crosscuts from theory to practice -- science, complexity theory, pluri-disciplinarity, and practical application – and not just public administration but public *policy* and administration. The development of a game to teach practitioners and others expanded

ways of knowing is a natural extension of Wittgenstein's concept of language-games, a notion integral to epistemic pluralism. Complexity theory has profound implications for macro PPA theory and understanding (Farmer, 2012a), implications which translate well to practical application. A cloud-based tool for use by practitioners, students, and others is within current technological capabilities. The cloud-based tool envisioned as part of this dissertation increases the creative and imaginative nature of knowledge and allows for further expansion as more disciplines and sub-disciplines are discovered.

Research Design. This research can be considered a mixed methods research design in the sense that it uses interpretivist methods of both qualitative and quantitative data. Qualitative methods capture themes of meaning and intention; quantitative methods provide machine analysis of free-form data as text. This research can also be considered mixed in the sense that it bridges interpretivism with positivism through a modified hermeneutic circle approach. The theoretical basis for the research is Ludwig Wittgenstein's concept of language-games. The objects of the research are texts in the form of major works by highly regarded twentieth century thinkers.

Specific aims. The central research question this dissertation will address is: What is the relevance of understanding and explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? The specific aims form the basis of questions to guide the research. The specific aims are:

SA1. Interpret and ground macro public policy and administration in complexity theory.

SA2. Interpret macro public policy and administration as pluri-disciplinary.

SA3. Demonstrate epistemic pluralism as the mechanism which cross-cuts the identified categories.

SA4. Construct meanings of macro public policy and administration concepts already in the literature.

SA5. Use the interpreted and constructed meanings of macro public policy and administration concepts to propose a gaming algorithm for a cloud-based application for public policy and administration decision-making.

The specific aims can be conceptualized with Figure 1.5 below.

Figure 1.5 Linking Theory to Practice

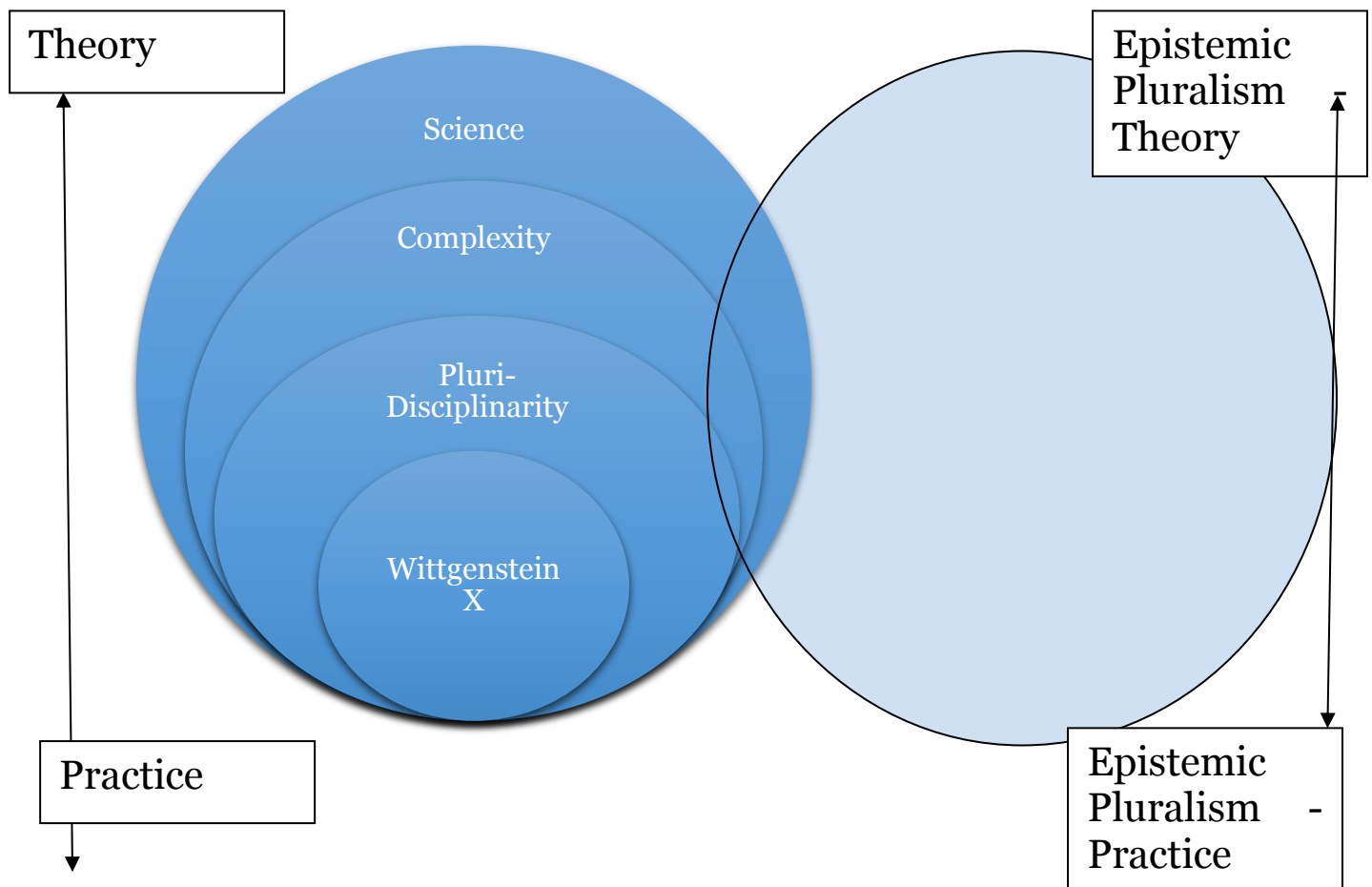


Figure 1.5 is a possible diagram to explain the relationships between the concepts. It illustrates how theory links to practice.

Science is the broadest and most comprehensive level. Complexity is within science as science is broadly understood. Within complexity is pluri-disciplinarity. And within pluri-disciplinarity is Wittgenstein X. Crosscutting these is another circular form that begins with epistemic pluralism (theory) and extends to epistemic pluralism (practice) and back again. Epistemic pluralism is shown as upgrading the link between theory and theory, theory and practice, and practice and practice.

Are there aspects of science that can be explained as not being complex? Put another way, is all of science complex? What lies outside the nested circles of Figure 1.5? And to go deeper still, are there aspects of public policy and administration that can be considered not to be complex?

Plan of the Dissertation

This chapter has set the stage for the dissertation. It introduced the topic, defined key terms, established the need for the research, and explained the research plan. A note about the literature review. The literature is integrated into the entire dissertation with references to the literature beginning in Chapter 1. When a research study is analyzing texts or documents or when the use of the literature is too complex to contain it to one chapter, it can be woven throughout the dissertation (Ridley, 2012). In the next five chapters, references to the literature will continue and the research will be developed. Chapter 2 will discuss contextual and textual underpinnings of the study categories in more detail. Chapter 3 will explain the methodology and research approach. Chapter 4 will report the results of the research. Chapter 5 will discuss implications for public policy in the context of big data. Chapter 6 will describe the various levels of complexity in terms of Wittgenstein X. This study will demonstrate the theoretical ways in which EP is the mechanism that moves traditional PPA thinking and practice to a distinctly post-

modernist and post-scientific-reductionist view, incorporating the complexity of the biological, psychological, social, and poetic aspects of modernity. EP moves PPA from Figure 1.3 to Figure 1.4 earlier in this chapter.

This chapter explained the rationale, defined key terms, provided a research overview, and discussed the plan of the dissertation.

CHAPTER 2

CONCEPTUAL/TEXTUAL UNDERPINNINGS

This section discusses the conceptual underpinnings of macro public policy and administration. It sets up the framework for analysis and lays the groundwork for the research to come. For that reason, study categories and textual underpinnings will be discussed briefly and developed further as the research and accompanying narrative progresses.

Questions of language and language-games are foundational to this study because they are inherent in the BPSS model and in epistemic pluralism. After first discussing Wittgenstein's concept of language-games, nodes of understanding will be introduced as well as study categories, epistemic pluralism, and macro public policy and administration. The work of Ludwig Wittgenstein has a central role in understanding macro public policy and administration. The source text for the theoretical basis of this study is *Philosophical Investigations* (1945/1958). Secondary sources will also be used including *The Realistic Spirit: Wittgenstein, Philosophy, and the Mind* by Cora Diamond (1991). This section begins with discussion of the *Philosophical Investigations* and a definition of language-games. In Chapter 4, each study question will be addressed in the context of language-games.

About *Philosophical Investigations*

The *Philosophical Investigations* (PI) reveals many layers of meaning and understanding (*Philosophical Investigations*, Preface). The flavor and direction of the

Philosophical Investigations is given from the opening quote, in Latin, from Augustine's *Confessions*. Augustine describes how he came to understand that words were significations. Augustine writes, "Ita verba in variis sententiis locis suis posita, et crebro audita, quarum rerum signa essent, paulatim colligebam, measque jam voluntates, edomito in eis signis ore, per haec enuntiabam"(From Augustine's *Confessions*, I. 8., as quoted in PI, §1). It demonstrates the tying together of word and activity. A deeper understanding could be that it demonstrates observation and conclusion.

What are the *Philosophical Investigations*? The *Philosophical Investigations* was first published in 1953, two years after Wittgenstein's death. It is considered a departure from Wittgenstein's earlier work, *Tractatus Logico-Philosophicus*, with some scholars dividing Wittgenstein's work into Wittgenstein I, referring to the *Tractatus*, and Wittgenstein II, referring to *Philosophical Investigations* (Edmonds & Eidenow, 2001).

Why does it matter? The *Philosophical Investigations* is important to this study because it sets forth the concept of language-games. Until the *Philosophical Investigations*, languages were thought of essentially in terms of linguistic differences. When Wittgenstein introduced the concept of language-games, he extended the meaning of language beyond linguistic differences to language as a set of tools. How the tools are used is understood inherently in the language and is not separate and apart from it. How the tools are used is an *activity*. This is the language-game.

What are language-games? Wittgenstein first defines a language-game in Section 7 of the *Philosophical Investigations*: "I shall also call the whole, consisting of language and the activities unto which it is woven, a 'language-game'." Use of the tools embedded in language-games are not distinct and finite but rather are overlapping. In

this way, language-games are complex. Meaning and understanding are embedded in further meaning and understanding. And “the grouping of words into classifications depends on our own inclination. . . they are many different kinds of classification (PI, §17). Wittgenstein says, “to imagine a language-game is to imagine a form of life” (PI, §19). Continuing the definition of language-game, Wittgenstein himself wrote in his diary on February 4, 1937, “With a new life one learns new language-games” (Klagge & Nordman, 2003, p. 169). A language-game is an overlapping of meanings that may sometimes be separate and apart from the actual words. To say that a language-game is a “form of life” (PI, §7) is to signify it as an activity; “life” is construed as active. Other authors have expressed these ideas similarly. Bertrand Russell in *Introduction to Mathematical Philosophy* writes that understanding of mathematics depends on the symbolism on which it is based (Russell, 1963), and that logical symbolism is necessary to understanding the subject. Jacques Lacan wrote that the “. . . unconscious is structured as a language” (1993, p. 167). Inputs and outputs are elements of the notion of symbolic declaration. To Lacan, symbols are not separated from the *use* of symbols. (Žižek, 2006). Slavoj Žižek describes symbolic declaration this way, “. . . every utterance not only transmits some content, but, simultaneously, *conveys the way the subject relates to this content*” (Žižek, 2006, p. 16, italics in original). The subject betrays intent with action. According to Žižek (2006), there are multiple motivations underlying activity. Activity can be used to achieve an end but so can “pseudo-activity.” Pseudo-activity is the desire to be active in order to prevent the undesired from occurring (p. 26).

Language-games transcend actual languages. Actions in silence can be language-games. Both Wittgenstein and Žižek, in describing Lacan, use the analogy of a chess set

to more fully describe the concept of language-games. Wittgenstein in *Philosophical Investigations* §31 et seq. discusses the meaning of “the king” as embedded in the actions of the king. Žižek (2006) uses the analogy of a chess set to describe the Lacanian concepts of the Symbolic, the Imaginary, and the Real. The Symbolic is rule-following: the rules about how to play the game, and more specifically, rules governing how to move each piece. The Imaginary is our understanding of the shape of each piece based on the name of each piece. The Real encompasses the entirety of the game itself: how the game is played by the players. As will be seen in Chapter 4, a language-game can serve to limit one’s understanding (Cors, Farmer, & Lau, 2013; Farmer, 1995).

Other philosophical influences are important to this study. The philosophers and works mentioned below were chosen because they are significant for philosophy and because their work is interesting and persuasive; however, the works of others not included here could also be informative.

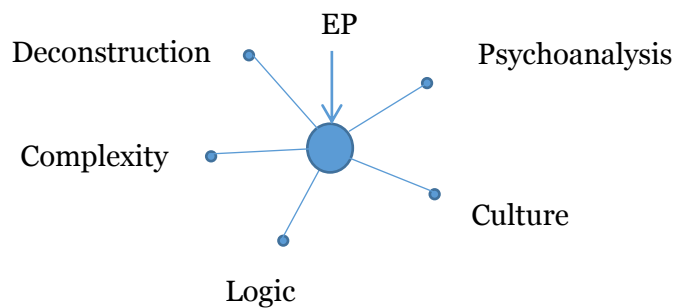
Nodes of Understanding

Expanding understanding of science as it is commonly understood involves examining conceptual underpinnings, complexity in the sciences, pluri-disciplinarity, and a discussion of what science is. There will be a central source that helps to explain and understand each concept; however, the research is not limited to that source. For example, when discussing Lacan, it may be appropriate to discuss alternative views or sources with which the views can be better appreciated and understood. Nodes of understanding will be more fully explicated in Chapter 4.

The use of the term “node” is intentional. The term node is used in network theory. A node is an origin, a destination, or a point through which network components are arranged. Albert-László Barabási is well-known for describing elements of scale-free

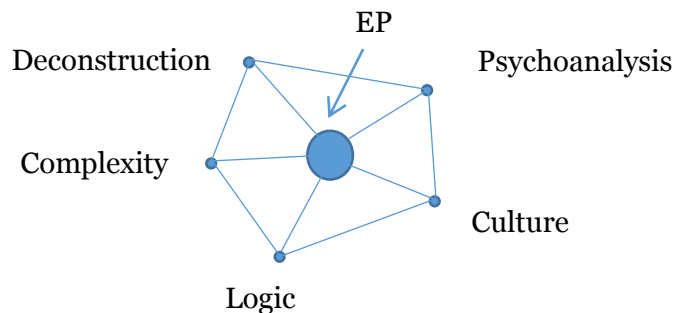
networks (Barabási, 2002, 2014). This study proposes that there may be many other types of networks, limited only by imagination. The illustrations below show the configuration of the philosophical influences for this study. The nodes can be arranged as hub and spoke, where EP is incorporating all spokes but the spokes are not connected to one another.

Figure 2.1 Simple Hub and Spoke



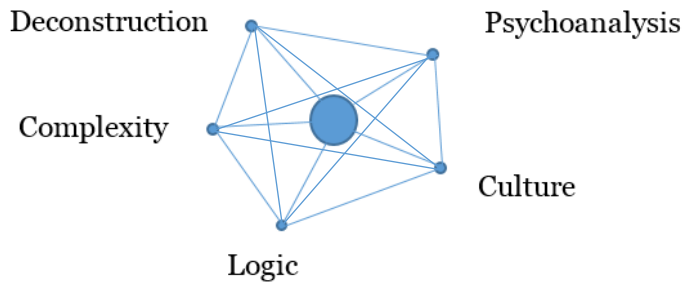
In Figure 2.2, EP is still the hub but the spokes are only connected to what is closest to them in space.

Figure 2.2 Hub and Spoke with Nearest Neighbor Connections



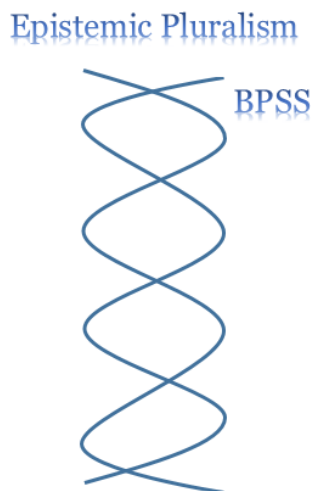
In Figure 2.3, each hub and spoke is connected to every other spoke. These configurations can evolve and change as more information is discovered.

Figure 2.3 Multiple Hub and Spoke Connections.



EP can be thought of as the hub because it expressly incorporates the BPSS model. BPSS is both a part of and transcends any network configuration. The limitation of this network view is that the hub and accompanying nodes appear two dimensional in nature. They are not. They are three dimensional in nature. Later in this study, EP will be shown to have a dilating effect on understanding. For now, it is important that EP and the BPSS model are woven together like the double helix strands of DNA. The BPSS model makes EP possible and necessary.

Figure 2.4 The DNA of Epistemic Pluralism



This network configuration will be revisited as it is applied to the practical policy problem of big data in Chapter 5.

Jacques Derrida and deconstruction. Derrida is instrumental in understanding the concept of deconstruction. Deconstruction pays attention to binary oppositions. Consider for example rational/irrational, superior/inferior, or politician/citizen. Derrida theorized that showing the subordinate term as superior would enhance understanding of the problem (Derrida, 1981). Further, Derrida considered the superior term to contain artifacts of the original construction. Another example is the term nonlinearity. Nonlinearity is seen as opposed to linearity where linearity is the superior term. But linearity as the superior term contains many assumptions that become obscured through the use of the term in language. The source used for Derrida's work is *Deconstruction and the Possibility of Justice* (1992).

Jacques Lacan and psychoanalysis. Lacan's conclusion that the unconscious is structured like a language, mentioned in Chapter 1, influenced his psychoanalytic practice. He considered the doctor and the patient to be co-creators in the psychoanalytic experience. Lacan's central contribution to psychoanalysis is that healing only occurs when the patient can see outside their reality. Slavoj Žižek, a contemporary philosopher and cultural theorist, has written extensively on Lacan's contributions. The works of Lacan can be understood by reading *How to Read Lacan* (Žižek, 2007), *Looking Awry* (Žižek, 1991), and *The Sublime Object of Ideology* (Žižek, 1989). More will be said about Žižek's interpretation of Lacan's work in Chapter 4.

Bertrand Russell and logic. Bertrand Russell was a logician and philosopher who advocated for "scientific truthfulness" which he described as basing "beliefs upon observations and inferences as impersonal, and as much divested of local and temperamental bias, as is possible for human beings" (Russell, 1945, p. 836). His work,

the *Introduction to Mathematical Philosophy* (1963) will be used for this study. Ludwig Wittgenstein was a student of Bertrand Russell.

Charles Taylor and culture. Charles Taylor considers the role of culture in modern life especially as it concerns the making and following of rules, and describes rules and rule-following as a language. Taylor's work is informed by Wittgenstein. The source text is *Sources of the Self: The Making of the Modern Identity* (1989).

The works of two other authors are material to this study and will be used in the research.

David John Farmer and epistemic pluralism. Farmer's seminal work on epistemic pluralism is *The Language of Public Administration: Bureaucracy, Modernity, and Postmodernity* (1995). *To Kill the King: Post-traditional Governance and Bureaucracy* followed in 2005. A follow-up book, a book more focused on application than theory is *Administration in Perspective: Theory and Practice through Multiple Lenses*.

Melanie Mitchell and complexity science. Mitchell is one of the first authors to explain complexity science to a popular audience while still including higher level mathematics.

Study Categories

What is science? Science can be considered as "the" way to get to the truth about a particular phenomenon (Diesing, 1991). But there is much disagreement on what counts as science and how to get there (Chalmers, 2013). Whyte described how many people thought that science only concerned something "fixed or immovable" (Whyte, 1930, p. 123). Einstein objected to this and demonstrated it with the Special Theory of Relativity (Whyte, 1930). For some, such as Karl Popper, science is about

falsification. For others, such as Feyerabend (2010), science is not about constraining research to the confines of particular methods or approaches. Boyd (1991) describes philosophy of science as centering on logical empiricism and reactions to it, such as scientific realism and constructivism. Logical empiricism, also known as logical positivism, posits that verification of meaning is accomplished either through falsification or disconfirmation via a set of procedures. This process should only be conducted through careful observation and deduction. It follows that “*no knowledge of unobservable phenomena is possible*” (Boyd, 1991, p. 6; italics in original). The alternative views of scientific realism and constructivism dismiss the outright dismissing of the unobservable world as theoretically and practically impossible.

Popper advocated for a falsificationist view. In Popper’s view, if a hypothesis could not be disproved, then science could not be advanced; it is only by “ruling out” possible explanations that a theory develops (Chalmers, 2013, p. 59). And it is this notion that is considered a priori part of the scientific method. There is difficulty with it, however. Einstein’s Special Theory of Relativity is not falsifiable; it was confirmed through observation after first being theorized. Consider another example given by Diesing (1982). Diesing challenges Popper’s notion of falsification by illustrating a case of three competing hypotheses, all with good fit to the data. Who decides which hypothesis is best? The answer is that the researcher decides. According to Diesing, “hypothesis testing requires an understanding of alternative hypotheses, and one’s *perspective* limits the alternatives that can be understood” (1982, p. 366). Popper criticized Kuhn while at the same time conceding, “I do admit that at any moment we are prisoners caught in the framework of our theories; our expectations; our past experiences; our *language*” (Popper, 1970, p. 56, emphasis added). Still, to Popper,

impartiality was of primary concern to the researcher and the concept of falsification was one avenue to ensure it.

Positivism and hermeneutics can be considered distinctly different in approach. Positivism aims to explain. Hermeneutics aims to understand. Perception of truth differs. The positivist may be sure of answers obtained from an objective approach. The hermeneutist is equally sure that the foundation upon which the positivist relies can be dramatically changed with only a small nudge. In positivism, the assessment of what is true only comes from the scientific method; therefore, by definition, if something has not been falsified based on the scientific method, then it is not true. In hermeneutics, the assessment of what is true comes from many sources both inside and outside the researcher, such as communications and cultural context. Gadamer wrote a seminal book on hermeneutics, *Truth and Method*. He will be discussed in Chapter 4 when the research method is introduced.

Many philosophers of science agree on the need for theory (Lakatos, 1978). “Questions first, methods second” captures the idea of not letting the data guide research but instead letting questions, questions informed by theory, guide research. Among examples of work that has been interpreted using hermeneutic methods and positivist methods is John Maynard Keynes’ *The General Theory of Employment, Interest, and Money*. Keynes (1936/1964) writes that “. . . it is often impossible to bring one’s ideas to a conclusive test either formal or experimental” (p. vii-viii). Keynes’ contemporaries attempted to understand his writing but approached it with pre-understandings of economics for the time (Diesing, 1991). But Keynes is explicit in the need to be free from the accepted economics canon. Keynes admits to a “struggle of escape from habitual modes of thought and expression. . . The difficulty lies, not in the

new ideas, but in escaping from the old ones” (p. viii). Science can also get lost in method. Keynes (1936/1964) writes

Too large a proportion of recent ‘mathematical’ economics are mere concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependences of the real world in a maze of pretentious and unhelpful symbols. (p. 298)

Keynes’ theory was empirically tested beginning about 1967 in an attempt to resolve questions of interpretation (Diesing, 1991).

Herbert Simon used hermeneutic methods in his book *Administrative Behavior* as he traced the understanding and meaning of organizations in order to inform his ideas on decision-making (Simon, 1945/1997). However, Simon claimed he used a logical positivist approach and later in the book equates logical positivism with empiricism. The book ends on a distinctly positivist note as Simon states that only “factual” statements have any “relevance to science” (Simon, 1945/1997, p. 360).

The difficulty with so called factual statements is determining what exactly is factual and what is not. What counts for big “T” truth and who gets to decide what counts? Prominent voices in economics and statistics have called for less mathematizing of science and more thinking about science. Deirdre McClosky (1995) is forthright in claiming that “statistical significance has nothing to do with scientific significance” (p. 189). She then laments that modern economic practice involves “regression equations, searching for statistical significance, in standard datasets, already collected and committed to machine-readable form” (p. 190). In the July 2013 issue of the *Journal of the American Statistical Association*, Rod Little, Professor of Biostatistics at the University of Michigan, advocates for simpler statistical methods (Little, 2013). His

article, “In Praise of Simplicity not Mathematisttry! Ten Simple Powerful Ideas for the Statistical Scientist,” describes the results of a simple poll of his colleagues. He asked colleagues to suggest three simple statistical ideas. The suggestion given most often by his statistician peers was “Histogram/plot the data/exploratory analysis.” Very low on this list was “Understand the question/what data are needed.” Histograms are simple but their placement on the list suggests they could be done more often. Understanding the question is a necessary first step in statistical analysis but it is not given much weight on this informal poll. Regardless, Little “feels that too much of academic statistics values complex mathematics over elegant simplicity – it is necessary for a research article to be complicated in order to get published” (Little, 2013, p. 359).

Complexity in selected sciences. This study will use Melanie Mitchell’s book, *Complexity: A Guided Tour* (Mitchell, 2009), as a central source. The reason why her book is considered central is because Mitchell is well-regarded among complexity theorists and her book has been very well-received. Mitchell is also a faculty member at the Santa Fe Institute. Other useful texts include *Complexity and Postmodernism* (Cilliers, 1998) and *Complex Adaptive Systems: An Introduction to Computational Models of Social Life* (Miller & Page, 2007). Complexity theory plays a role in many sciences. The following are two brief instructive examples from economics, and the subject of this work, public policy and administration.

Economics. Keynes (1936/1964) acknowledges in *The General Theory* that any discussion of the level of prices was complex and the various component factors could not be considered independently, as is the case in so many economic models. He wrote,

The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves

with an organized and orderly method of thinking out particular problems; and, after we have reached a provisional conclusion by isolating the complicating factors one by one, we then have to go back on ourselves and allow, as well as we can, for the probable interactions of the factors amongst themselves. (Keynes, 1936-1964, p. 298).

Thomas Schelling, winner of the Nobel Prize for Economic Sciences for his work on game theory, discusses the complexity of social behavior in *Micromotives and Macrobehavior* (2006). He describes how an individual's choice about a particular behavior may, in some instances, be related to other individuals' choices and those choices in the aggregate are dynamic.

Herbert Gintis, another game theorist and a member of the faculty at the University of Massachusetts, Central European University, and the Santa Fe Institute, has extended traditional game theory in economics beyond its roots in rationality to game theory that allows for properties of “emergence, transformation, diffusion, and stabilization in forms of behavior” (2009, p. xvi).

Public Policy and Administration. In public policy and administration, complexity theory can be seen as early as the work of Lasswell (1958). Lasswell in the postscript to his seminal work, *Politics: Who gets what, when, and how?*, writes “Theories of decision must also account for the demands and expectations made in the name of a *collective*” (1958, p. 208, emphasis added). He goes on to refer to the “political process” as complex. Contemporary scholars such as Huff and Ruijter (2013) apply concepts from complexity theory to open government. They theorize that achieving the aims of open government may only occur when there is a shift in the culture of an organization. This shift is conceptualized as distinctly nonlinear in nature.

Lasse Gerrits' most recent work, *Punching Clouds: An Introduction to the Complexity of Public Decision-Making* (2012), challenges scholars to apply elements of complexity science to public policy and administration decision-making. He suggests that doing so will upgrade the quality of public policy and administration decisions and clearly advocates using concrete tools to do so.

Pluri-disciplinarity. According to Gerring (2012), division of social science disciplines and subdisciplines occurs in three broad areas: problem focus, theory, and methods. Yet the benefits of pluri-disciplinarity deserve to be recognized: The social science disciplines can offer insights as divided disciplines and subdisciplines work together. And this goes beyond social science disciplines to possibly most disciplines in science. Neuroscience, for example, is recognized as bridging the so called hard sciences with the behavioral sciences. It may also be a way to bridge positivism with hermeneutics. Positivism may explain unconscious behavior and hermeneutics assists with understanding the meaning of behavior. Experimental designs (positivism) can help practitioners and others identify unconscious bias. Interpretation (hermeneutics) of that bias informs understanding.

System. A system can be described as a collection of elements. The collection of elements may be ordered or not. Systems can be open or closed and may be subject to or influenced by external pressures. Easton (1979) characterized political systems within social systems as being adaptive, having coping mechanisms, and being influenced by the larger social environment. Understanding systems is also about understanding the mechanism that links different elements in a system. Arthur (2014, p. 3) describes policy systems as systems that “play out over time given a set of policies that define

them.” The Affordable Care Act and Medicaid are two examples of policy systems. These policy systems will be discussed further in Chapter 4.

The work of Jürgen Habermas informs system thinking. Habermas (1991) described two spheres: the public sphere and the private sphere. He argued for a discourse in which private persons affected by public policy actions participate in system level input, both at the macro level, a large-scale implementation, and the micro level, the particular individual level (Aday, 2010). Policy outcomes then emerge from the increase in mutual understanding by both parties in the policy system.

What is Epistemic Pluralism and why does it Matter?

Epistemic pluralism is developed as a grand strategy in *Public Administration in Perspective* (Farmer, 2010) and has precursors in prior works. It matters because using a grand strategy of epistemic pluralism has the potential to upgrade PPA’s language-game.

Epistemic pluralism described. When problems are viewed from more than one perspective, insights and implications can be considered. Multiple perspectives inform a person’s ability to view, to incorporate, and to recognize the role of culture and language that may not have been considered previously. As applied to macro public policy and administration, epistemic pluralism asks practitioners, policymakers, and others to, instead of being self-conscious, to be uniquely conscious of the self, conscious of interactions with others, and to be open to new understandings.

What is macro public policy and administration? Macro public policy and administration concerns the complexity of elements in government. These elements may include but are not limited to: the system in which decisions are made by various levels of practitioners from low-level practitioners to high-level political appointees and

policymakers; the information available to make decisions; and the interpretations of available information. This system includes interactions by the various levels of government as well as across governments. The interpretation of available information by persons inside and outside a bureaucracy or government may be limited by a person's way of looking at the inner world and outer world. Philip Ball (2013) is informative when he writes, "... a universal curiosity becomes not only permissible but essential: we can rule out nothing a priori" (p. 98).

How is epistemic pluralism related to macro public policy and administration? Epistemic pluralism, already defined above as knowing and in more than one way, is related to macro public policy and administration because it offers a way to increase the creative and imaginative nature of knowledge. Epistemic pluralism is applicable to both theory and practice. It is applicable to theory by encouraging the researcher, student, and others to think about public policy and administration problems from multiple perspectives and levels and offers a practical method for doing so. The practical method has applications for many sub-disciplines in public policy and administration including organizational behavior, management, policy analysis and decision-making. Epistemic pluralism in practice enlarges the solution set of optimal possibilities for problem resolution in public policy and administration.

What is decision-making? What is policy analysis? Decision-making and policy analysis, like many subtopics in public policy and administration, have blurred boundaries (McCool, 1995). Mosher (1968) writes that the "important issues of administrative morality today attends the reaching of decisions on questions of public policy which involve competitions in loyalty and perspective between broad goals of the polity (the phantom public interest) and the narrower goals of a group, bureau, clientele

or union” (p. 210). The relationship between decision-making and policy analysis may be bi-directional: Decision-making may influence policy analysis but policy analysis may also influence decision-making. The relationship may also be nested: Policy analysis can be thought of as the “parent” to decision-making as a subset; however, decision-making may encompass policy analysis. The two may at times be distinct but they may also have blurred boundaries. The relationship between decision-making and policy analysis can be thought of as complex and pluri-disciplinary.

Applications to Electronic Governmentality

Electronic governmentality has benefits but may also include traps. The benefits are that governance of all kinds may be more efficient, more convenient, or better functioning. In *The New Digital Age: Reshaping the Future of People, Nations and Business*, Eric Schmidt, Executive Chairman of Google, and Jared Cohen, a director at Google Ideas, sketch the future as one that can be described as “anarchy” (2013, p. 3): so many people have access to the Internet and the power to create social change is at their fingertips. People have staged protests around the world after receiving word of a protest through social media. The trap is that people can become prisoners to the very technology that liberates them. The use of the term “prisoners” is intentional and is meant to describe prisoner in the Foucaultian (Foucault, 1977) sense. A byproduct of the technological achievement seen with the Internet, aside from (but not putting aside) the profound inequalities of citizenship engendered by the digital divide, is the normalizing of what it means to be a person who “fits in” to the new digital age. The trap is that the subject in governmentality with regard to the specific example of the Internet is now guided by specific ways of acting and participating in the new digital age. Social media has so permeated contemporary life that even teachers are requiring students to have

Facebook accounts. All the while, governments surveil to unprecedented levels (Shane, 2013).

CHAPTER 3

METHODOLOGY – AN INTERPRETIVIST APPROACH

This chapter will discuss the methodology for the research. It begins by introducing Gadamer's work in hermeneutics and then introduces a modified hermeneutic circle as the method of inquiry.

This is an interpretive inquiry into macro public policy and administration using a modified hermeneutic circle approach. Hermeneutics involves the interpretation of objects under study where *object* is taken to mean texts, people, events, or experiences. A hermeneutic *circle* describes the researcher's interpretation of objects, absorbing their meaning, and then interpreting the same or other objects. There is a basic circularity between the parts and the wider context of the study with the whole being described by the parts and the parts described by the whole (Wagenaar, 2011). In a hermeneutic study, there is not an independent or dependent variable. Some well-known hermeneutic studies include Schumpeter's *Capitalism, Socialism, and Democracy* (1962) and Simon's *Administrative Behavior* (1945/1997). The hermeneutic circle is described by Gadamer (1989) and further explained by Diesing (1991).

Gadamer and the Hermeneutic Circle

Gadamer describes hermeneutics as the way a text is analyzed as the word text is broadly defined. In *Truth and Method*, Gadamer did not use the term "analyze" but clearly wrote about the responsibility of the researcher to be aware of "fore-conceptions"

of the meaning of text (Gadamer, 1989, p. 269). Researchers are expecting texts to contain certain elements. Gadamer resolves this by stating “*The hermeneutical task becomes of itself a questioning of things* and is always in part so defined” (1989, p. 271; italics in original). This process of questioning is a way for the researcher to become aware of unconscious bias.

Gadamer (1989) explains that all science, even “natural” science, has some relation to hermeneutics because of the context in which science is conducted. The social world is ever-present. Results must be described in a way that can be understood by the information receiver. At that juncture, the social world, the language world, enters. Meaning matters so the scientist must describe results in a way that conveys the intended meaning. Diesing wrote that “Hermeneutics is appropriate in any science whose implicit goal is to improve communication and mutual understanding; a corollary goal is to facilitate joint action, or in general living together” (1991, p. 140). He articulated that the hermeneutic tradition starts with attempts to interpret the meaning of a text. It is not limited to the text, as text is understood, but extends to the broader sphere of context and history. This continuous questioning of knowledge or what is found then refines the proposed explanations or answers in a circular pattern (Diesing, 1991).

The modification involves quantitative analysis of text. Interpretive methods are strengthened with quantitative analysis of textual meanings. Quantitative analysis of textual meanings has been shown to increase understandings of meaning (Krippendorff, 2013) and is generally accepted in many disciplines (Grimmer & Stewart, 2013; Guest, MacQueen, & Namey, 2012; Kluver, 2011; Taddy, 2013).

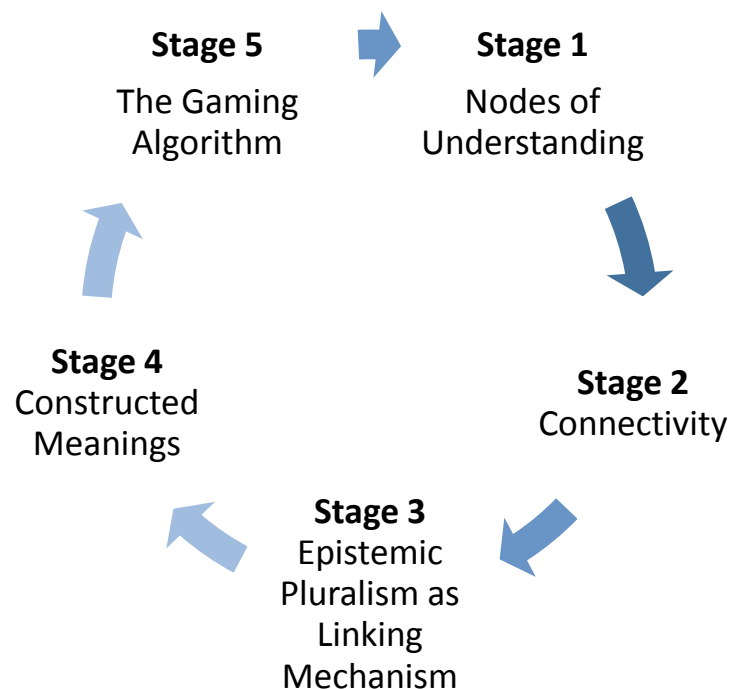
The research design, analytic strategy, limitations and justifications are described below.

Research Design: A Modified Hermeneutic Circle

With any research design, the question is how the methods will provide answers to the research question(s). Maxwell (2005) discusses categorizing strategies such as coding and thematic analysis. According to Maxwell, such categories can then be connected through connective devices or strategies such as narrative analysis. The research design should flow logically from research questions to selection to data collection to data analysis (Maxwell, 2005).

The modified hermeneutic circle approach described here contains a logical flow. It employs a stages approach to the research. Figure 3 depicts the stages approach.

Figure 3.1 A Modified Hermeneutic Circle



Expanding understanding through qualitative research.

Stage 1. Recall the central research question: What is the relevance of understanding and explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? The identified categories to answer this question are “science,” “complexity,” “pluri-disciplinarity,” “system,” and “governmentality.”¹ “Science” can be construed as the parent term for all discovery, of which public policy is a part.

Each of these categories may be represented in the work of five twentieth century philosophers. The categories may be in the work of other philosophers as well; however, these philosophers are chosen because their work has been influential and people have reacted to it.

1. Ludwig Wittgenstein. Language-games are integral to an understanding of the complexity of macro public policy and administration.

2. Jacques Derrida. The work of Derrida is important to the present study because Derrida’s work involves identifying the ways in which people seek out black and white constructs. Derrida asks people to instead identify where dichotomies exist and to reconsider them in new ways.

3. Jacques Lacan. Jacques Lacan is important because he considered the unconscious to itself be a language.

4. Bertrand Russell. Bertrand Russell is important because his work involves logic and abstract reasoning. The logical form of problem solving is necessary to

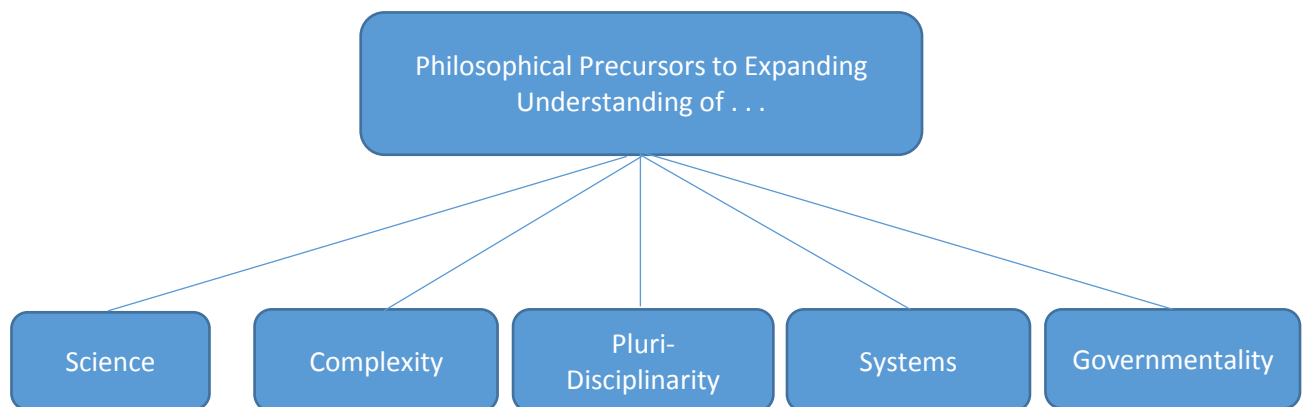
¹ “Cloud-based public policy and administration” can be seen as digital governmentality. The intent of this conception is to convey the meaning that public policy and administration can occur outside of traditional platforms; collaboration, discussion, and decision-making can occur virtually, and may be enhanced through the use of digital media.

expanding understanding and illustrating possibilities. Also, Wittgenstein was Russell's student.

5. Charles Taylor. Charles Taylor explores the role of the self in culture. Decision-making does not occur without being a part of the culture as that culture is part of the larger society in which it resides.

The work of these philosophers will be seen as “nodes” of understanding. As noted in Chapter 2, “nodes” is an apt metaphor because nodes represent focal points and connect categories in sometimes mysterious ways. Further, a change in one node may signal a change in another node. Nodes of understanding and connections between them are illustrated in Figure 3.2.

Figure 3.2 Nodes of Understanding



Stage 2. Stage 2 connects the categories. In order to connect the categories, this step asks the following questions:

1. What are aspects of science? What aspects of science are relevant to complexity? In what ways is science connected to complexity?

2. What are aspects of complexity? What aspects of complexity are relevant to pluri-disciplinarity? In what ways is complexity connected to pluri-disciplinarity?

3. What are aspects of pluri-disciplinarity? What aspects of pluri-disciplinarity are related to systems?

4. What are aspects of systems? What aspects of systems are relevant to governmentality? In what ways are systems connected to governmentality?

5. What is governmentality? What aspects of governmentality are related to a cloud-based game such as Wittgenstein X?

These questions will be answered in Chapter 4. Aspects of science may link to aspects of complexity, and so on, until the terms Science, Complexity, Pluri-Disciplinarity, Systems, and Governmentality are all connected.

Epistemic pluralism as the link between expanding understanding and illustrating possibilities.

Stage 3. Epistemic pluralism is understood as cross-cutting all categories by demonstrating that each of these concepts or aspects are in *The Language of Public Administration* (Farmer, 1995) or *Public Administration in Perspective* (Farmer, 2010). By definition, the parent category is then seen as represented by epistemic pluralism.

Illustrating possibilities through quantitative research.

Stage 4. Once epistemic pluralism has been shown as the mechanism cross-cutting the categories, the next step is to construct meanings of perspectives in *The Language of Public Administration* (Farmer, 1995). Chapters 10-13 discuss imagination, deconstruction, deterritorialization, and alterity. This step will employ a quantitative text analysis strategy to construct meanings of each perspective. These meanings will be used to operationalize the perspectives for a gaming algorithm. One

might ask what the counterfactual is to operationalizing the perspectives. More precisely, how will the researcher know if the perspectives have been operationalized incorrectly? One response is that operationalizing text is very different than operationalizing discrete data points or collections of data points. One way to increase confidence in operationalizing is to compare meanings of the operationalized concepts with meanings in the literature. A broad definition of science acknowledges differences between and among definitions. Just as there is often not a one right way to get from A to B, there may be multiple ways to define and operationalize the terms imagination, deconstruction, deterritorialization, and alterity.

Stage 5. In order to construct a gaming algorithm, a logical structure must be followed. The first part of the logical structure is to set parameters to null. The second step in the gaming algorithm is to choose an element. Elements in the game are elements of macro public policy and administration.² The third step is to choose perspectives. Perspectives need not be limited to one perspective. Further, perspectives need not be limiting or limited. For example, Diesing (1982) discusses data science. What can be learned from data science? Gintis (2009) encourages thinking outside the “game” by widening the accepted understanding of game theory. Other useful perspectives are behavioral economics, physics, and literature. For simplicity, the game will be demonstrated first with one perspective and then with two perspectives. Perspectives identified in *Public Administration in Perspective* (Farmer, 2010) include neuroscience, economics, business, and political science but are not limited to those identified perspectives for purposes for the game (or for any other purposes). The next

² Elements of macro public policy and administration can include planning, managing, imaginative creativity, and many others. Elements are not to be seen as limiting.

step is to ask, “What is the implication of [insert perspective from Step 3] for [insert element of macro PPA from Step 2]?” or “What is the implication of *such and such perspective* for *such and such element*?” For a specific example, ask “What is the implication of deconstruction for planning?” Aspects of deconstruction tell us. . . Aspects of imagination tell us. . . Aspects of deterritorialization tell us. . . Aspects of imagination tell us. . . Another example is to ask “What is the implication of imagination for managing? Deconstruction, imagination, deterritorialization, and alterity will be operationalized as determined in Stage 4.

As mentioned previously, the purpose of Stages 1 through 5 is not to come up with one best solution but rather to come up with a solution set of optimal choices, choices developed through the creativity of one or more public administrators as they practice EP.

Analytic Strategy

The analytical strategy that will be used is as follows:

1. Identify the philosophical underpinnings of the general categories of the central research question. (Stage 1)
2. Establish a connection between at least one aspect of each of the general categories to the next. (Stage 2)
3. Explain Epistemic pluralism as cross-cutting all general categories. Demonstrate this by showing each of these aspects (and by extension, their parent category) in *The Language of Public Administration* and *Public Administration in Perspective*. (Stage 3).
4. After EP is shown to cross-cut all general categories from Stage 3, proceed to Stage 4. In Stage 4, construct meanings using a quantitative analysis of text on the four

postmodern perspectives in *The Language of Public Administration*. The constructed meanings are of:

- a. Imagination
- b. Deconstruction
- c. Deterritorialization
- d. Alterity

5. Using the constructed meanings from Stage 4, construct an algorithm. The purpose of the algorithm is to increase the imaginative nature of knowledge. The algorithm is the foundation for demonstrating the use of EP in a game.

Table 3.1 shows the analytic strategy for the study.

Table 3.1

Analytic Strategy

Stage	Description	Detail	Categories/ Connections	Analytical Strategy	Links to
1	Nodes of Understanding	The work of Derrida, Lacan, Mitchell, Russell, and Taylor underpins (expands understanding of) the categories	“science,” “complexity,” “pluri-disciplinarity,” “system,” and “governmentality”*	Using a central text, establish connection to each of the general categories as that category is commonly explained and understood (see Definition of Terms in Chapter 1). Applied thematic analysis.	Stage 2
2	Connectivity	The connectivity of	Connect one or more aspects of	Analyze aspects of	Stage 3

		categories	science to one or more aspects of complexity to one or more aspects of pluri-disciplinarity, and so on.	each category; establish connection between aspects. Applied thematic analysis.	
3	Epistemic pluralism as cross-cutting	Demonstrate this by showing each aspect from Stage 2 (and by extension, their parent category) in <i>The Language of Public Administration</i> , <i>To Kill the King</i> , and <i>Public Administration in Perspective</i>	To be identified; demonstrates macro application of epistemic pluralism	Applied thematic analysis.	Stage 4
4	Construct Meanings of Perspectives	Perspectives are Imagination, Deconstruction, Deterritorialization, and Alterity	To be identified; demonstrates micro application of epistemic pluralism	Quantitative text analysis of Chapters 10-13 in <i>The Language of Public Administration</i> (Chapters 10-13) using R statistical software.	Stage 5
5	Develop an optimization gaming algorithm			Use logic of computer programming	Stage 1

*Governmentality in this context means macro public policy and administration.

Two analytic techniques will be used to answer the research question. For stages 1, 2, and 3, a thematic analysis technique will be used. For stage 4, a quantitative textual analysis technique will be used.

Applied thematic analysis (Guest et al., 2012) is a technique for analyzing themes in data. While typically used for analyzing data that originates through focus groups or interviews, it can also be used to interpret texts and documents. An inductive approach can also be followed.

Quantitative textual analysis has been shown to improve interpretive research; however, analytical techniques are in a nascent stage. These techniques have been used in political science (Grimmer & Stewart, 2013), statistics (Taddy, 2013), and in other disciplines (Guest et al., 2012). The actual words of text are shown to convey meanings including such things as how often a word is used and in what context. The inherent difficulty with analyzing text as data is similar to analyzing numbers as data: so much is left out. Still, there is much to discover and learn. As an example, consider John Maynard Keynes' use of the word "idea" in *The General Theory* (1936/1964). Keynes used the word "idea" 18 times (Glahe, 1991). Consider the following table of frequencies of Keynes' use of various terms.

Table 3.2

Frequency of Terms in The General Theory

Term	Frequency
Complex	28 times
Corpus	1 time
Employment	> 600 times

Idea	18 times
Multiplier	45 times

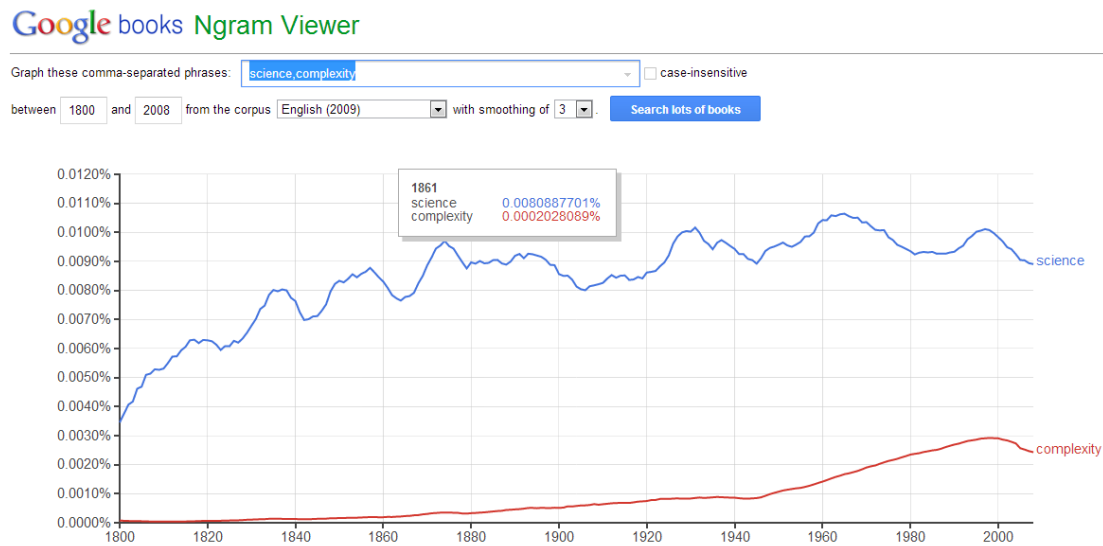
The example of Keynes is deliberate because Keynes was offering a very different perspective to government's role in the economy, a perspective that countered the classical theorists who taught Keynes. Keynes' contributions to economic thought were profound. It cannot be said that descriptive statistics of text as quantitative data offer no value in interpretation nor that quantitative data offer the complete story of the text. Keynes himself describes not mentioning something in the text as itself being a method. Referring to Mill's refutation of the Wages-Fund Theory, Keynes writes in *The General Theory*, "Their method was to dismiss the problem from the *corpus* of Economics not by solving it but by not mentioning it" (Keynes, 1936/1964, p. 364; italics in original).

What can be said is that descriptive analysis of text offer insight into meaning, intention, and purpose of the work. Quantitative analysis for the purpose of this research will be used to augment understandings of text in Stage 3.

Text analysis will first begin with preprocessing the data. Preprocessing consists of first creating a dataset. According to Taddy (2013), preprocessing includes removing punctuation and words such as "the" and "is," and stripping words to their root form. Each word then becomes what is known as a "token." The dataset is comprised of tokens. A single token or group of tokens, commonly referred to as *n*-grams, can also be analyzed. The *n* in this context is the number of words in the group of tokens. For example, the word *language* is a unigram token and the phrase *language-game* is a bigram token.

Google has developed a tool for visualizing the number of times a certain word or words is found in the database of Google books. As illustrated below, the use of the term “complexity” doubled from 1940 to 2000. What it does not show is the meaning or context in which the term is used.

Figure 3.3 Google books Ngram Viewer



Validity

Validity can be increased through rigorous application of the methods. The proposed methodology strengthens the validity of the results because it adds a quantitative textual analysis component to an overall interpretive design. However, “absolute validation is impossible in a technical sense; we can never ‘prove’ a theory is totally valid because we can never test all potential disproofs” (McCool, 1995, p. 13).

Justification

Numerous works have used interpretivist or hermeneutic approaches to research. The modified hermeneutic circle approach described here also satisfies the criteria outlined by Maxwell (2005) on elements of a good research design. This approach

further strengthens traditional hermeneutic approaches through the use of quantitative text analysis (Krippendorff, 2013).

Limitations of Approach

Limitations of any approach can be recognized. A limitation of positivism is that it tells a narrowly constrained story. A limitation of hermeneutic approaches and interpretative approaches more generally, is that partiality exists. Catlaw (2007) notes that choice of texts is always partial, meaning there are undoubtedly texts left out, and also that choice of texts conveys a partiality on the part of the researcher. Even though choosing texts to study is a limitation of hermeneutic study, it is a limitation countered with arguments about why certain texts are chosen. In this case, the texts are chosen because contributions to the knowledge base by the identified authors have been profound, stood the test of time, and continue to have a lasting influence. Still, much can be said about what is left out as Catlaw (2007), Keynes (1936/1964), and Žižek (1989) note.

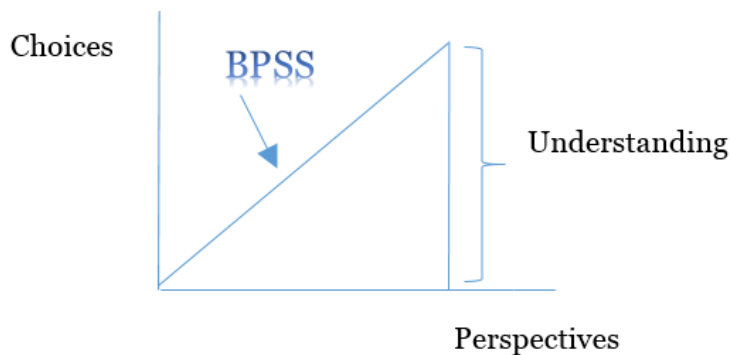
This chapter outlined the methodology for the research. It began by explaining Gadamer's work in hermeneutics and then introduced a modified hermeneutic circle as the method of inquiry.

CHAPTER 4

ANALYTICAL RESULTS: THE NARRATIVE OF THE CONSCIOUS

This chapter will explain the analytical results of Stage 1 through Stage 5 of a modified hermeneutic circle discussed in Chapter 3. The results are explained as *conscious* because they concretely follow from the specific aims of the study. As noted earlier, the aim of this study is to show that EP precisely and concretely provides value to PPA. Looking at Figure 1.4 again,

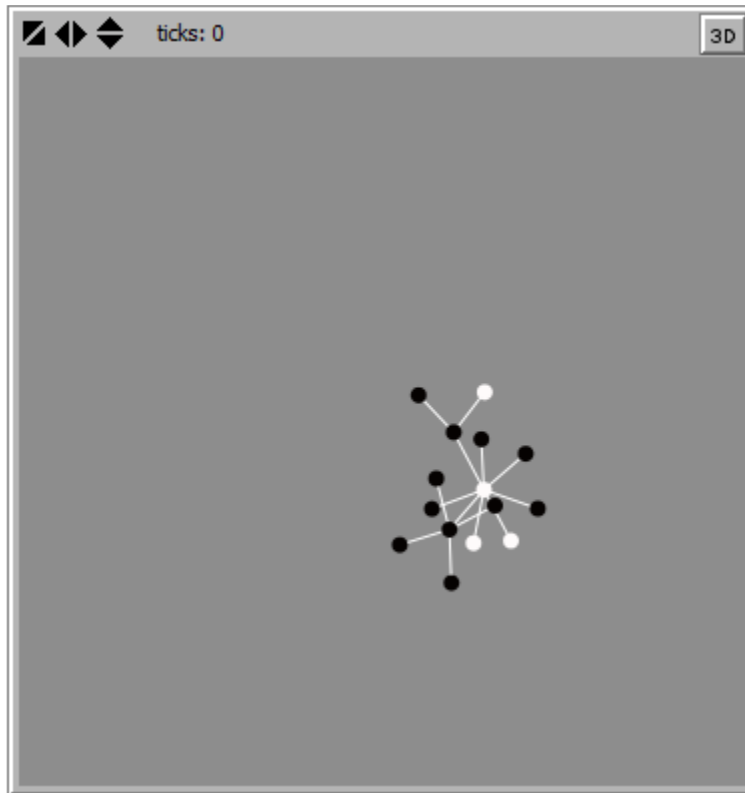
Expanded Understanding through Multiple Perspectives



one can see that as the number of perspectives increases, the number of choices may also increase, especially as one takes into account increasing degrees of the BPSS model. The result is expanded understanding. One result from Stage 5, a result discussed toward the end of this chapter, is that increased understanding, even when using

methods developed for complexity research, such as agent-based modeling, still involves research in two dimensions. As seen in Figure 4.1, and discussed later in this chapter,

Figure 4.1 NetLogo Work Space – 15 Nodes



two-dimensional space is limited, both in terms of practical research, and in terms of inspecting visual attributes. At the end of this chapter, two distinct approaches for approaching policy questions will be explained. The first approach will be the use of a gaming algorithm and the second is agent-based modeling. Both will be shown as ways to address a specific policy question. Chapter 5 will then explore the use of epistemic pluralism and its application to big data. This chapter begins with the results of Stage 1.

Analytical Results of Stage 1

The aim of Stage 1 is to uncover the philosophical underpinnings of the research question. The research question is: What is the relevance of understanding and

explaining public policy as a complex and pluri-disciplinary system and how is this related to big data? In order to uncover nodes of understanding embedded in the research question, this stage asks the following (sub)questions: What is Science? What is Complexity? What is Pluri-Disciplinarity? What is a System? What is meant by Science as a Complex and Pluri-disciplinary System? Earlier in Chapter 2, study categories were identified. This section explores the categories in depth.

The central philosophical underpinning for this study is in the concept of language-games, a concept introduced and explained by Ludwig Wittgenstein in *Philosophical Investigations* and discussed in Chapter 2. Each of the study questions is explored within the context of language-games. To understand the questions in the context of language-games, other philosophical sources are useful. This study identified the sources listed in Table 4.1.

Table 4.1

Framework for Analysis: Important Authors and Sources

Author	Type of Source	Title and Year
Ludwig Wittgenstein	Primary	<i>Philosophical Investigations</i> , 1958
	Secondary	<i>The Realistic Spirit: Wittgenstein, Philosophy, and the Mind</i> by Diamond, C. (1991) <i>Ludwig Wittgenstein: Public and private occasions</i> edited by Klagge and Nordmann (2003)
Derrida, Jacques	Secondary	<i>Deconstruction and the Possibility of Justice</i> edited by Cornell, Rosenfeld, and Carlson (1992)
Farmer, David John	Primary	<i>The Language of Public Administration: Bureaucracy, Modernity, and Postmodernity</i> (1995); <i>Public Administration in Perspective: Theory and Practice through Multiple Lenses</i> (2010)

Lacan, Jacques	Secondary	<i>How to Read Lacan</i> by Žižek (2007); <i>Looking Awry</i> by Žižek (2007); <i>The Sublime Object of Ideology</i> by Žižek (1989)
Mitchell, Melanie	Primary	<i>Complexity: A Guided Tour</i> (2009)
Russell	Primary	<i>Introduction to Mathematical Philosophy</i> (1963)
Taylor	Primary	<i>Sources of the Self: The Making of the Modern Identity</i> (1989)

What is science? As Wittgenstein develops the *Philosophical Investigations*, he explores meaning and understanding layer by layer in a seemingly infinite regress. Exploration of meaning and understanding can be said to be “science.” Concepts and key words related to science are found in numerous places in the *Philosophical Investigations*. Table 4.2 lists some of these words.

Table 4.2

Words denoting Scientific Concepts in Philosophical Investigations

Word	Location in <i>Philosophical Investigations</i>
Experiment	§161
Derived	§162
Causation	§169
Fusion	§171
A priori	p. 97e
Sequences	§8
Signify	§10

Many of these words are commonly associated with science. In addition, the *Philosophical Investigations* contains many phrases that can be understood as concepts of science. These are listed in Table 4.3.

Table 4.3

Phrases of Scientific Concepts in Philosophical Investigations

Phrase	Location in <i>Philosophical Investigations</i>
Act of expectation	§452
Associative connection between word and thing	§6
Causal and logical dependence	§220
Implication of two groups	§170
Intangible influence	§175
Law of identity	§216
Measurement of thickness of boilers	§478
Observing how pain is manifested or interpreted	§393
Perform actions and react	§6
Secondarily of the names of certain actions and properties	§1
Something contains the absence of something else	§448

Science is a set of assumptions. Each layer is itself built on a layer. Each layer is an assumption. Assumptions are built on other assumptions. What are the assumptions of science? E. O. Wilson defines science as “the *organized, systematic enterprise that gathers knowledge about the world and condenses the knowledge into testable laws and principles*” (1998, p. 53, italics in original). Wilson goes on to describe the basic tenets of science: replicability, independence of observer, and confirmation. These are the general components of the scientific method.

Science depends on replicable results. Replicability is a hallmark of the scientific method. Yet many studies do not have this quality. Replicability is difficult and sometimes impossible to achieve; demonstrating replicability depends on sample size, effect size, and other factors (Ioannidis, 2005).

Observer independence is a necessary condition for objectivity. True science is without bias. How can one detect one’s own bias? If true science is without bias, what can be said about the topics one chooses to study? Are they a reflection of one’s own bias? Yet science depends on researcher objectivity.

There are limits to understanding the assumptions of science. Charles Taylor in *Sources of the Self* describes reliance on assumptions as something so embedded as to be unseen (1989, p.491). Belief is not formed because it is unconscious. In this way, reality, or some realities are not questioned (Taylor, 1989, referring to §84 of Wittgenstein’s *On Certainty*). Wittgenstein is more direct in §88 of *On Certainty* where he writes: “It may be. . . that *all enquiry on our part* is set so as to exempt certain propositions from doubt, if they are ever formulated. They lie apart from the route travelled by enquiry” (Wittgenstein, 1969, §88, italics in original). Žižek’s understanding

of Lacan's conception of the unconscious betrays the same conundrum: "... society's unwritten constitution, is the second nature of every speaking being: it is here, directing and controlling my acts; it is the sea I swim in, yet it remains ultimately impenetrable – I can never put it in front of me and grasp it. It is as if we, subjects of language, talk and interact like puppets, our speech and gestures dictated by some nameless all-pervasive agency" (Žižek, 2006, p. 8).

The limits of my technology mean the limits of my understanding of science. There are technological limits to understanding the assumptions of science. Russell (1919/1963) writes,

Just as the easiest bodies to see are those that are neither very near nor very far, neither very small nor very great, so the easiest conceptions to grasp are those that are neither very complex nor very simple (using 'simple' in a logical sense). And as we need two sorts of instruments, the telescope and the microscope, for the enlargement of our visual powers, so we need two sorts of instruments for the enlargement of our logical powers, one to take us forward to the higher mathematics, the other to take us backward to the logical foundations of the things that we are inclined to take for granted in mathematics (p. 2).

Klagge and Nordman (2003, p. 344) relate a story told by one of Wittgenstein's students. The question was how to test whether a rope could be described as "infinitely long." Wittgenstein asked: if the end was never found, could the rope be described as infinite? Other characteristics of the rope could be described, such as its observed length, but not whether it was infinitely long. The use of a word is its meaning.

The limits of my metaphor mean the limits of my understanding of science. There are metaphorical limits to understanding the assumptions of science.

For example, *causation* is a concept linked to science. Put simply, phenomenon x is said to cause phenomenon y . This is a basic building block of intuition and discovery; scientists seek to confirm, or disconfirm as it were, this relationship. But the understanding of causation can be limited by the metaphors ascribed to causation such that a root understanding of x causing y may not be available. If causation is explored in a metaphorical sense, one discovers that a root layer of causation is elusive. Lakoff and Johnson (1980) suggest that causation is “experiential gestalt. A proper understanding of causation requires that it be viewed as a cluster of other components” (Lakoff & Johnson, 1980, p. 70). Causation is complex.

Is science simple? Cultural understanding of science implies that science is simple. It is based on building blocks and the ability to rigorously test each building block is not questioned. It can be deconstructed to simple statements stated mathematically. One of the building blocks is the Periodic Table of the Elements. However, what if science needs to be simple to be understood? What if the true state of science is actually complex? Russell (1919/1963) mentions the possibility of “endless regress; that whatever appears as a particular is really, on closer scrutiny, a class or some kind of complex” (p. 142). What can be seen as simple now may instead be seen as simple because the complexity that lies beneath is not yet seen. Indeed the technology may not exist to discover that a chemical element is actually a compound chemical. What counts as evidence? Do all new discoveries arise from empirical evidence? (Chalmers, 2013). Feyerabend gives examples of discoveries not based on evidence, where scientists went “against method” to conclude that in the real world as in the lab, “anything goes” (Feyerabend, p. 14 as quoted in p. 146 of Chalmers, 2013). Discovery of the Higgs Boson was not based on empirical evidence – it was theorized first and then

nearly proven decades later. Yet science continues to be regarded as suspect without empirical evidence. When Peter Higgs was awarded the Nobel Prize in 2013, he is reported to have said “I hope this recognition of fundamental science will help raise awareness of the value of blue-sky research” (Overbye, 2013).

Consider use of the word “significant.” What exactly is significance and what is meant when the word is used?

Science is often understood to mean causality when correlation is actually what is meant. Historically, science meant either explanation or understanding, but not both. Whereas Karl Popper advanced the idea that scientific discovery occurs only through falsification, Paul Feyerabend rejected methodological rules. He contended that no existing theory is ever consistent with all the relevant facts. Feyerabend suggested that scientific *pluralism* improved existing theory (Feyerabend, 2010).

Science is a language-game. All of the above examples, reliance on assumptions of science and then limits to assumptions of science point to science as a language-game. Science is defined as not so much as a word, e.g., objectivity, replicability, as the *use* of the word. There are conflicting definitions of science. The presence of objections to something, the question of whether or not it contains or does not contain something else, is a language-game. As Paul Feyerabend (1993) writes,

Even the most perfect standards or rules are not independent of the material on which they act (how else could they find a point of attack in it?) and we would hardly understand them or know how to use them were they not well-integrated parts of a rather complex and in places quite opaque practice or tradition, viz., the language in which the *defensor rationis* expresses his [sic] stern commands. (p. 224, italics in original).

One objection to characterizing science as a language-game (and there may be other objections) is the existence of the Periodic Table of the Elements. These elements are thought to be the root layer of all matter. But key elements, such as water (H₂O) and air (O₂) are left out because they are composites of elements. Some scientists have called for abandoning the table altogether and reconceiving it as a set of cultural symbols (Ball, 2004b). As an element is found not to be a root element but instead a composite of other elements, it is displaced from the Periodic Table of the Elements. New root elements are then made part of the Periodic Table of the Elements. So the Periodic Table of the Elements exists so long as an element is not itself irreducible. But as Philip Ball suggests this depends on how good a chemist one is (Ball, 2004b, p, 67). If the elements are the proverbial building blocks of science, science can be understood to be built on layers of prior understanding. The elements of scientific understanding are theory, measurement, evidence, ideas, and imagination, and there may be others. Science is more than the summation of its individual reductionist components: The whole may not equal the sum of the parts. Elements and elemental understanding is itself complex.

What is Complexity? So what exactly is complexity? What is complexity science? There is not one, central agreed upon definition but there is also little disagreement. Writing in the journal *Nature*, M. Mitchell Waldrop (2008) mentions the components of a definition: emergence, nonlinearity, and adaptive behavior. Melanie Mitchell defines complexity in terms of complex systems. In *Complexity: A Guided Tour*, she proposes two definitions for complex systems. First, a complex system is “a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution” (Mitchell, 2009, p. 13). Mitchell

then proposes another definition: “a system that exhibits nontrivial emergent and self-organizing behaviors” (Mitchell, 2009, p. 13). Concordance exists between the Waldrop and Mitchell definitions on emergence and adaptive behavior. Mitchell introduces nonlinearity in the context of sensitive dependence on initial conditions: outcomes vary greatly depending upon the original state of nature. A linear approach would be something like first A then B then C. A nonlinear and more complex approach is first A then B or C depending on the attributes of A (Byrne, 1998). Einstein’s Special Theory of Relativity emphasizes the notion that what is seen depends on perspective. A person on a train might observe themselves as not moving but someone observing a train passing by might observe it as moving fast. There is no absolute perspective, only relative perspectives.

The study of complex systems is not easily distilled to simple mathematical models but lends itself well to computational models. Computational models often include elements of predicting a particular social phenomena, such as the spread of a contagious disease. Computational modeling in complexity theory also involves new understandings of game theory (Gintis, 2009). One component of complexity not explicitly mentioned in Waldrop and Mitchell’s definitions is its inter-disciplinary nature. Mitchell writes: “. . . complex systems research has emphasized above all interdisciplinary collaboration, which is seen as essential for progress on the most important scientific problems of our day” (2009, p. 300). The interdisciplinary nature of complex systems is also noted in the *Manifesto of Computational Social Science* by Conte et al. (2012). They write that “. . . the complex systems approach . . . is a crucial lever towards blurring the dividing line among disciplines and creating a truly interdisciplinary, noncompartmental science” (Conte, et al., 2012, p. 341). The

interdisciplinary nature of complexity is evident from the names of the various centers for complexity study in the U.S. and around the world. Some examples are:

Center for Interdisciplinary Research on Complex Systems at Northeastern University

Center for Social Dynamics & Complexity, Arizona State University

Center for the Study of Complex Systems at the University of Michigan

Complexity Sciences Center at the University of California, Davis

George Mason University Center for Social Complexity

Harvard-MIT Observatory of Economic Complexity

LSE Complexity Group, The London School of Economics and Political Science

Max Planck Institute for the Physics of Complex Systems

Northwestern University Institute on Complex Systems

Santa Fe Institute Studies in the Sciences of Complexity

University of Southampton's Institute for Complex Systems Simulation

Others consider artificial intelligence to be part of complexity science. As an example, consider the logico-linguistic form of artificial intelligence. It is based on Wittgenstein's concept of language-games.

Complexity means there are overlapping language-games. Some of the overlapping language-games in complexity are language, technology, metaphor, science, mathematics, and human learning. The editor's note to the 1963 edition of Russell's *Introduction to Mathematical Philosophy* notes that ". . . apparent simplicity may conceal a complexity which it is the business of somebody, whether philosopher or mathematician. . . to unravel."

Lacan concluded that the “unconscious is structured like a language.” And consider the complexity of it: the three inter-related yet separate aspects of the unconscious or the Symbolic, the Imaginary, and the Real. They are each overlapping, each with its own language.

Complexity is a language-game. The activity of complexity is a language-game. One could say, “The limits of my science means the limits of my world” paraphrasing Wittgenstein (1922). The way in which complexity is defined at the various centers for complexity study will determine the limits or boundaries of study. The centers often have a stated mission and the missions could be very different. Some centers concentrate on social complexity, other centers make no distinction between social complexity and other types of complexity.

What is Pluri-disciplinarity? According to Farmer (1995), pluri-disciplinarity is the “juxtaposition of related disciplines” (p. 222). The Social Science Research Council called for uniting disciplines in the 1920s. The call was part of a wider Progressive Era movement to develop organizations of expertise that could dispense disinterested knowledge to policymakers. These organizations would tap leading thinkers in various fields to think creatively about how to rid the nation of the social and political ills brought on by the Industrial Revolution. In 2001, the National Science Foundation convened a workshop to discuss ways to bridge the divide in Political Science between formal modeling and empirical analysis. The initiative, known as Empirical Implications of Theoretical Models or EITM, provided funding to universities to apply the principles of EITM to specific problems. Political scientists attended the workshop as well as mathematicians and economists. It addressed, in part, the compartmentalization of

fields in Political Science, such as American Government, Comparative Politics, and International Politics (National Science Foundation, 2002, p. 6).

Bertrand Russell (1919) writes that boundaries of subjects are fluid: “The nature of infinity and continuity. . . belonged in former days to philosophy, but belongs now to mathematics” (Russell, 1919, p. xi). Did a topic jump disciplinary boundaries or were boundaries considered fluid?

Pluri-disciplinarity is a seeing outside of one’s disciplinary cult-de-sac. Waldo is well known for writing: “Administrative thought must establish a working relationship with every major province in the realm of human learning.” And E. O. Wilson defined consilience as: “Linking of facts and fact-based theory across disciplines to create a ground work of explanation” (Wilson, 1998, p. 8). According to Wilson (1998), this technique of looking across disciplines offers “the value of understanding the human condition with a higher degree of certainty” (p. 8).

Pluri-disciplinarity is a language-game. Each discipline has its own language-game and this can be confusing. A precise example is symbolic notation in statistical modeling. Some textbook writers use small b for beta, other textbook writers use an upper case script B . When beta is meant as an estimator it may have a hat as in \hat{B} or may be in bold as in **B** . Bold may also symbolize matrix notation. In order to understand the language-game of statistics, one must have an understanding of the symbolic notation and the differences in notation depending on the writer.

What is a System? A system is a set of categories or classifications that may be interconnected or that may be independent but have a similar quality in common. Decisions are made about what bits are or are not part of the system. Some common examples of systems are economic systems, monetary systems, political systems,

computer systems, and complex systems. In the Google Books corpus, the use of the term “economic system” peaked around 1940 while the use of the term “political system” peaked around 1970. Systems creation encounters immediate difficulties. For instance, development of a computer system, an algorithm for answering a question, is subject to the decisions of the coder. According to Scott de Marchi (2005), “There are simply too many choices made in the process of coding a model for the primary researcher to be disengaged from the process” (p. 114). Other examples of systems are such things as doctor/patient relationships. Both the doctor and the patient are expected to operate within a set of rules. In systems of moving parts, one part cannot function without the other parts.

Systems are built on language-games. The activity of systematizing something is a language-game. The act of constructing categories relies on having some characteristic in common, some “family resemblance.”

What is Governmentality? There is a governmentality aspect, a power aspect, to what counts as science. The term governmentality was coined by Michel Foucault (Huff, 2006). Foucault conceptualized a power relationship such that a subject is subject to the power of the power. This can be thought of as a parent/child relationship, as a policymaker/citizen relationship, and so on. The subject becomes normalized to the expected behavior. *Electronic* governmentality concerns the electronic ways in which people are subject to the powerful.

Governmentality, and its electronic analog, is a language-game.

Returning to Žižek’s interpretation of Lacan, “It is as if we, subjects of language, talk and interact like puppets, our speech and gestures dictated by some *nameless all-pervasive agency*” (Žižek, 2006, p. 8, emphasis added). In their discussion of significance, Ziliak

and McClosky (2008) go on to discuss how acceptance of less than rigorous research, as evidenced by a fuzzy understanding of statistical significance, is perpetuated by text book authors and journal editors. Everyone in every place is subject to something outside themselves. This is the essence of governmentality. Facebook and Linked In are two examples of what can be called governmentality. Persons who participate in these forms of social media are expected to behave a certain way and there are consequences when they do not. Governmentality can be obvious or obscure. Derrida offers a solution and a method: challenge predominant thinking through deconstruction. A priori understanding of deconstruction is that there is not a unitary meaning to a text.

Language-games are themselves an embodiment of governmentality. In the biblical story of the Tower of Babel, the people were governed by god, dispersed to the ends of the earth for trying to complete a technological achievement. Consider Žižek's statement of Lacan: "For Lacan, language is a gift as dangerous to humanity as the horse was to the Trojans: it offers itself to our use free of charge, but once we accept it, it colonizes us" (Žižek, 2006, p.13). Susan Crawford might agree. Virtual language occurs on the Internet. But it is subject to a vast amount of governmentality. What may have once been considered free or at least a public good is no longer. The free market did not work as advertised: with the recent United States Supreme Court decision on net neutrality, internet access, and more importantly, speed of internet services, is considered a luxury good (National Public Radio, 2014).

What is meant by Science as a Complex and Pluri-disciplinary System? The meaning of science as a complex and pluri-disciplinary system is itself a

language-game. Meanings are embedded within meanings and the meanings are separate and apart from the word itself.

Analytical Results of Stage 2

While researching nodes of understanding, it became apparent that the study terms are not in and of themselves finite and they are not distinct from other study terms. While the research began with the assumption that study terms would be distinct and have only minimal subparts in common, for example science would be considered distinct from complexity which would be distinct from pluri-disciplinarity, and so on, that was not the case. There are no clear lines of demarcation between the topics. The words *science*, *complexity*, *pluri-disciplinarity*, and *systems* are each language-games in and of themselves and yet they may be comprised of many or multiple language-games in an infinite regress. To then look for distinctions between the meanings of the words themselves in order to draw connections between the terms, is futile: the terms are all related. The terms merge into a whole tied together by a Wittgensteinian family resemblance.

$$science = complexity = pluri-disciplinarity = systems = governmentality$$

If the order of the terms were scrambled they would still be equal in the sense of contributing to the whole. The terms can also be said to merge into a whole, where the whole is greater than the sum of the parts.

$y > f(x)$, where $x = science, complexity, pluri-disciplinarity, systems, governmentality$ and

$$y > science + complexity + pluri-disciplinarity + systems + governmentality$$

where y is expanded understanding. The terms embody the “family resemblance” of overlapping language-games (PI, §67). To illustrate this, consider science. If science can

be thought of in terms of dichotomies, then science is either simple or complex. But science can be both simple and complex; the property of reducibility only applies when it is known whether the property exists. “Science is complex” is our connection between science and complexity. Using the definition of complexity from above, complexity is seen as nonlinear, as adaptive, and as emergent precisely because of sensitive dependence on initial conditions. Pluri-disciplinarity is itself nonlinear. The meaning of pluri-disciplinarity is not hierarchical with one discipline embedded within another, and subsequent disciplines embedded within another, and so on. Rather the disciplines have a pluralistic feature – many are connected in unknown or not so obvious ways. This can be seen as distinctly nonlinear. Wittgenstein saw clearly that categorization depended on the person doing the categorizing; Lakoff and Johnson (1980) suggest that categorizing cannot be distinct from human experience. Categorizing may itself be an unconscious activity, “a form of life.” Russell (1919/1963, p. 30) captures this point, that categorizing is an activity, when describing the ordering of sets. He suggests that sets can be ordered in many ways but our noticing of the ordering is limited by our attention. He goes on to say that all orderings are “equally valid.”

The idea of noticing the ordering may be relative to one’s perspective. Einstein viewed relativity as applying both in the macro sense, to astronomical bodies, and in the micro sense, to the internal vibration of atoms. But at the time of Einstein’s theorizing, at least one noted scientist, Dr. Ernst Mach, did not believe there was enough evidence that an atomic world existed (Ball, 2004a). Language-games of the definition of science may constrain scientific discoveries.

Upon further analysis, language-games can be described as macro or micro language-games depending on context. Whereas economics by itself can be considered a

micro language-game, economics plus culture can be considered a macro language-game. The interaction between economics and culture involves two spheres at many different levels. Complexity science when restricted to either computational modeling or to abstract theorizing can be considered a micro language-game. Macro language-games would involve complexity as a whole, wholly embracing multiple perspectives in the search for new understandings.

Through Stage 2, it can be seen that all aspects under study are themselves linked to the next aspect in a Wittgensteinian Family Resemblance. The concept of a Wittgensteinian Family Resemblance has also been explained. The next three stages of the present study are: epistemic pluralism as the link between theory and practice, different levels of theory, and different levels of practice (Stage 3), the construction of meanings in order to operationalize perspectives (Stage 4), and what is loosely referred to as “a gaming algorithm” (Stage 5). The purpose of these stages is to complete the hermeneutic circle (explained in Chapter 2) where each concept leads to the next in a circle of expanded understanding.

Analytical Results of Stage 3

This stage follows Stage 2 where concepts were shown to be linked in a Wittgensteinian Family Resemblance. Chapter 3 identified the purpose of Stage 3 was to demonstrate that each aspect from Stage 1, shown to be connected to other aspects in Stage 2, is evident in either *The Language of Public Administration* or *Public Administration in Perspective*. First, *To Kill the King: Post-Traditional Governance and Bureaucracy* (Farmer, 2005) is also necessary to appreciate Farmer’s corpus on epistemic pluralism. Second, it is not necessary that each aspect be itself precisely defined in *The Language of Public Administration*, *To Kill the King*, or *Public*

Administration in Perspective but that one or more of the aspects or even the general category be in evidence. One could raise the objection that while the emphasis of this research is in stepping outside narrow definitions of science and research practice, e.g., qualitative, quantitative, or mixed, the tendency is to employ a positivist approach. One response is that the approach is not positivist so much as logical. To make statements in terms of equations does not imply the use of positivism as a research approach but does imply the use of logic in seeking answers. Similarly, investigating a text for certain themes does not imply positivism as an approach but does imply an interpretative method.

Epistemic pluralism as linking mechanism. In Figure 1.5, Epistemic pluralism is seen as the mechanism linking the various levels of theory and practice. Epistemic pluralism (EP) is agnostic to purpose. Some researchers study and contribute theoretical understandings to the knowledge base. Other researchers study and contribute practical implications of theoretical understandings. Epistemic pluralism offers a way to expand understanding of both theory and practice. It may be helpful, first, to discuss why the source texts were chosen and to describe them.

The Language of Public Administration was chosen because even though it does not mention epistemic pluralism explicitly, it employs EP through examining public administration as a case study. From a high-level view it can be said, and has been said by scholars, that *The Language of Public Administration* is itself a statement of Epistemic pluralism without being overtly so (Marshall, 2011). It is notable that Farmer contends the subject of the book, public administration, may represent a case study of sorts and that the book's discussion and arguments may be applied to "other social sciences and action programs" as well. (Farmer, 1995, p. 4). A literal interpretation of

this statement is that Farmer's case study approach to understanding public administration can be used with many disciplines. Farmer is using a high level or macro approach to public administration as the subject of the study and he is using micro approaches as well through the numerous examples that support his contentions. That is precisely epistemic pluralism. The subject of explanation can be narrow or broad. While the objective of the study, is to explain it through multiple lenses or perspectives. There are multiple ways of knowing, of *episteme*, ergo epistemic pluralism.

To Kill the King was chosen because it explores the way in which PA practitioners and others can be uniquely conscious in focus. It involves recognition: recognition of self, of others, of one's place in the world. The title "To Kill the King" implies a reification of PA. PA has become king. Rather than PA appearing now and then, it is taking on a life of its own (Robinson, 2002).

Public Administration in Perspective was chosen because it sets forth a methodical way to apply concepts of EP to PPA problem-solving. *Public Administration in Perspective* is then a guide for researchers applying epistemic pluralism in practice.

Before discussing the results of Stage 3, it is useful to reiterate the concepts and linkages completed in Stage 2. Stage 3 then investigates whether these aspects are in *The Language of Public Administration*, *To Kill the King*, or *Public Administration in Perspective*. Table 4.4 below shows the aspects to find.

Table 4.4

Concepts and Aspects from Stage 2

Concept No.	Concept	Aspects
1	Science . . .	Set of assumptions
		Replicable results
		Observer independence
		Limits to understanding
		Limits of technology
		Limits of metaphor
		Simplicity
2	Complexity	Emergent
		Self-organizing
		Adaptive
3	Pluri-disciplinarity	As anti-cult-de-sac
		Shared vocabulary across disciplines
		Shared symbolism across disciplines
4	Systems	Interconnected parts
		Sets of rules
		Characteristics in common
5	Governmentality	Power aspect
		Deciding about what counts
		Normalization of the subject

The analytic strategy was accomplished according to Guest et al. (2010), as set forth in Chapter 2. Guest is accomplished in methods for analyzing texts. According to Guest, the purpose of the analysis has a practical purpose and an analytic purpose. In this case, the practical purpose is to link macro public policy and administration to micro public policy and administration. The analytic purpose is to interpret meanings of the selected categories in order to better understand and operationalize the complexity of public policy and administration. The “bounds of the analysis” (Guest, et al. 2010, p.33) are the form of analysis and the source texts. As mentioned above, the source texts are *The Language of Public Administration*, *To Kill the King*, and *Public Administration in Perspective*. The form of the analysis is to investigate whether the

category is in the text and how it is recognized as being in the text. According to Guest, et al. (2010, p. 52), the researcher should “first identify any instances of meaning in the text and note where it is found, describe the meaning conveyed” “What are the specific meaningful elements in the text?” Guest et al. provide further detailed guidance and suggest using at least one quote “to illustrate a theme.” A simple word search or looking for key words in context (KWIC) may not address locus and context adequately (Guest et al., 2010, p. 52). The themes to analyze are science, complexity, pluri-disciplinarity, systems, and governmentality. These are the identified themes from Chapter 2 of this dissertation.

Science. This theme is found broadly in *The Language of Public Administration* beginning with the statement in the preface that “A major finding is that modernist public administration theory (as science, as technology, as enterprise, and as interpretation) encounters crippling dead-ends” (Farmer, 1995, p. ix), and discussed specifically in Chapter 5, Modernity: Limits of Scientism.

Science as a set of assumptions. An instance of this meaning is found in *The Language of Public Administration* when Farmer discusses challenges or oppositions to doing science the way it has always been done. Farmer writes that results are “privileged *if* derived in accordance with scientific procedure” (Farmer, 1995, p. 71, emphasis added). One procedure would be engaging in research starting with a set of assumptions: assumptions about the subject and the object of study, their expected behavior and the conditions under which one can expect their behavior to depart from what is expected. A locus of this meaning describes how the emphasis on accepted procedures excludes “value judgments” and that such value judgments are included within an identifiable subject matter: administrative ethics. (Farmer, 1995).

A description of the meaning of a set of assumptions in the text is found in the discussion of the scientific method, especially as it concerns testable hypotheses; testable hypotheses concern a set of assumptions by definition. A hypothesis is not constructed without a priori information, information leading the researcher to construct the hypothesis. A researcher cannot have a testable hypothesis without it having been based on a priori knowledge.

The meanings that are conveyed by a set of assumptions are that there is status given to scientific propositions but that this emphasis has declined over time (Farmer, 1995, p. 73). A counterexample is that thought propositions have no status. According to Farmer, “a statement of initial conditions” is necessary to deduce statements or rules about expected behavior that then must be falsified, if one adheres to a Popperian approach. When a set of assumptions is used, the approach is deductive in nature, positivist, and continues sometimes to incorporate falsifiability. As Farmer writes, Popper considered induction to be a myth (Farmer, 1995). The table below shows the aspects of science and where they are found in the source texts.

Table 4.5

Concepts of Science

Concept No.	Concept	Aspects	Text Located	Evidence
1	Science . . .	Set of assumptions	<i>The Language of Public Administration</i>	Limits of Scientism
		Replicable results		
		Observer independence		
		Limits to understanding	<i>To Kill the King</i>	Start with Plato Playing
		Limits of technology	<i>The Language of Public Administration</i>	Modernity: Limits of Technologism
		Limits of metaphor	<i>To Kill the King</i>	Listen to Symbols
		Simplicity		

Complexity. What evidence is there in *The Language of Public Administration*, *To Kill the King*, or *Public Administration in Perspective* of complexity as defined in Chapter 4 and shown in the table below?

Table 4.6

Concepts of Complexity

Concept No.	Concept	Aspects	Text	Evidence
2	Complexity	Emergent	<i>The Language of Public Administration</i>	Limits of Modernity: Deterritorialization
		Self-organizing		
		Adaptive		

The concept of emergence is found in a number of places in *The Language of Public Administration*. In the discussion of deterritorialization in post-modernity with regard to nonorthodox organizational theory (Farmer, 1995, p. 212 et seq.). What is emergence in this context? What is self-organization in this context? And what is meant by adaptive in this context? Can the property of emergence exist without the property of being adaptive?

In the second paragraph on page 212, all these meanings are found in the context of the philosophy of science. This paragraph describes complexity of science without literally describing complexity of science. In fact, the stated context is in “organization theory and inquiry.” Farmer refers to Lincoln and Guba’s “seven moves in which society operates.” One is the “shifts from the simple to complex.” Yet every use of the term complex cannot be taken to mean complexity science. At the Santa Fe Institute’s Graduate Workshop in Computational Social Science and Complexity held in Summer 2014, Russell Golman explained complexity as consisting of the following: parts, behavior, interaction, and adaptation. The point is that every time the word “complex” is

used, it does not infer complexity science. Neither does the author imply that one must analyze a problem according to Golman's criteria before referring to it as complex. It is simply more complex than that.

Returning to Farmer's discussion of Lincoln and Guba's seven moves, he refers to them as "emergent" (Farmer, 1995, p. 212) when quoting Clark from *Organizational Theory and Inquiry: The Paradigm Revolution* (Clark, 1985). Clark discussed "nonorthodox paradigm of organizational theory which sets as its goal to be deliberately complex" (Farmer, 1995, 213).

At this juncture, another definition of complexity deserves to be examined, one not mentioned in Chapter 4, and that is nonlinearity. Many phenomena are nonlinear in nature. And although standard statistical techniques assume linearity, nonlinearity, in and of itself, is not an indication of complexity. Complexity is broad, comprised of parts, parts interacting together to produce new patterns not otherwise visible, it is not an automatic label given to a problem when data are not linearly dispersed. Complexity is not one thing, but multiple things all coming together.

One could interpret Farmer's discussion on deterritorialization to say "Organizations are emergent, self-organizing, and adaptive" rather than saying what organizations are not. The chapter in *The Language of Public Administration* on deterritorialization goes on to discuss naturalistic inquiry, its perceived traps, and responses to those traps. Farmer lists Lincoln and Guba's 14 points of naturalistic inquiry (Farmer, 1995, p. 216), including emergence (point No. 8), adaptation of methods (point No. 4), and self-organizing where he writes "patterns of mutual shaping that are likely to exist" (Farmer, 1995, p. 217).

Pluri-disciplinarity. Farmer mentions pluri-disciplinarity, not by name, but by definition, by alluding to “Relatively few persons are able to look at societal issues with a background that ranges across all relevant disciplines.” This statement emphasizes the importance of its opposite: Looking at issues through the perspectives acquired from a “background that ranges across all relevant disciplines” (Farmer, 1995, p. 218). Farmer then goes on to discuss the discipline-specific vocabulary that serves to trap persons within disciplinary boundaries, creating blind spots. In Chapter 4 of this research, pluri-disciplinarity was defined according to the following table.

Table 4.7

Concepts of Pluri-disciplinarity

Concept No.	Concept	Aspects	Text Located	Evidence
3	Pluri-disciplinarity	As anti-cult-de-sac	<i>The Language of Public Administration</i>	Limits of Modernity: Deterritorialization
		Shared vocabulary across disciplines		
		Shared symbolism across disciplines		

A counterfactual would be if *The Language of Public Administration* were discipline-specific, if it advocated one approach, one set of vocabulary, and one form of shared symbolism. Farmer goes out of his way to avoid such narrow thinking in *The Language of Public Administration* and further extends this to action in *Public Administration in Perspective*. In his review of *Public Administration in Perspective*, Marshall writes that Farmer advocates a more “heterodox” approach to public administration (Marshall, 2011, p. 640). *Public Administration in Perspective* specifically mentions the value of symbols in shaping public administration (Farmer,

2010, p. 13-14). Pluri-disciplinarity would then imply shared symbolism. In summary, anti-cult-de-sac can be anti-administrative, seen in *Public Administration in Perspective*; shared vocabulary can be found in *The Language of Public Administration* in the discussion of Keynes needing to write in the vocabulary of his discipline in order to be heard; shared symbolism would get us out of the vocabulary trap.

Systems. When hearing the word “system,” the tendency is to think of physical systems. However, the context of “system” in this research goes beyond the physical to other examples, such as the biological, psychological, social, and spiritual or poetic (BPSS), mentioned in Chapter 1. In *The Language of Public Administration*, Farmer discusses modernity and the limits of technologism and calls for integration of “systems,” “management,” and “ethical considerations.” This could be viewed as a meta-system, or a system of systems. At a macro level, systems can be considered bio, psycho, social, and spiritual or poetic. At a micro level, a system can be such things as an automobile engine or the data system of a public administrative agency. Both have interconnected parts, rules that govern connections, and characteristics in common. Interconnected parts might mean the way a user enters information in a database and an analyst then retrieves it from the database. It could also be when you press on the gas pedal to a car and it accelerates. A macro level would have these connections at a higher level, such as mentioned above with ethical considerations.

The question for public administrators, and one Farmer discusses in *The Language of Public Administration*, is whether systems are agnostic to influences of values or ethics. When one thinks about a database system designed to meet the needs of a public program, one thinks it must be agnostic, having no influence from values or ethics. But Farmer identifies a contrary. What is modeled in a system and the decision of

what components to include in a system, is precisely grounded in values and ethics.

Consider the effort by some state and local social service agencies to adopt a No Wrong Door systems approach. In such a system, an applicant for social services needs to go to only one social service agency or website to apply for the benefits of all the social services agencies in that locality. Policymakers may consider efficiency in adopting such a system but they may also wish social service benefits be easily available to applicants, an ethical consideration.

Table 4.8

Concepts of Systems

Concept No.	Concept	Aspects	Text	Evidence
4	Systems	Interconnected parts	<i>The Language of Public Administration</i>	Modernity: Limits of Technologism
		Sets of rules	<i>To Kill the King</i>	Self & Detrius
		Characteristics in common		

Governmentality. Governmentality was identified as having a power aspect, as the ability to decide what counts, and extension of the power aspect, and as normalization of the subject. Farmer writes in Chapter 10 of *The Language of Public Administration* of Foucault’s “shepherd game” and “city game” (Farmer, 1995, p. 177). Whoever is master of the game, an implied power aspect, gets to decide what counts: “Foucault distinguishes between the shepherd game (concern for the welfare of each sheep) and the city game (making laws and administering laws to group)” (Farmer, 1995, p. 177).

Table 4.9

Concepts of Governmentality

Concept No.	Concept	Aspects	Text Located	Evidence
5	Governmentality	Power aspect	<i>The Language of Public Administration</i>	Chapter 10, Postmodernity: Imagination
		Deciding what counts		
		Normalization of the subject	<i>To Kill the King</i>	Start with Michelangelo: What I, a Bureaucrat, Expect

The primary aim of Stage 3 was to find evidence of one or more of the definitions of each of the categories in *The Language of Public Administration* or *Public Administration in Perspective*. These two books make up the central corpus of epistemic pluralism. Once the link to this corpus is established, epistemic pluralism as the linking mechanism between Stage 2 and Stage 4 becomes clear. The theoretical basis is set, now the practical application unfolds.

Analytical Results of Stage 4

The purpose of this stage is to operationalize each of the postmodern perspectives from *The Language of Public Administration*: Imagination (Chapter 10), Deconstruction (Chapter 11), Deterritorialization (Chapter 12), and Alterity (Chapter 13). The purpose of operationalizing the perspectives is to use them in Stage 5, the gaming algorithm. Yet, operationalizing the perspectives has limits.

Limits of Operationalizing. There are at least three limitations of operationalizing the postmodern perspectives. First, operationalizing them may convey the idea that boundaries around the terms exist. Second, operationalizing them may convey that other operationalizations of the same terms represent contraries. And, third,

operationalizing them may convey that this particular method is the only way to develop new knowledge. All three limitations may be myths. Operationalizing these postmodern perspectives is a way of modernizing them to fit research objectives. Much is lost in doing so. Operationalizing serves as a guide, not the definitive guide. One approach to operationalizing the perspectives without setting boundaries or constraints is to pose questions rather than make statements. This is one technique to move beyond the limits of modernity. Questions inevitably raise more questions. Statements have more constraints. As Farmer writes in *The Language of Public Administration*, “Postmodernism is radical skepticism” (Farmer, 1995, p. 146).

The original research plan was to analyze the chapters with data analysis software, first performing data cleaning as described by Taddy (2013). Taddy’s approach may work with many source texts but the chapters under analysis in *The Language of Public Administration* employ a writing style not easily analyzed by computer. Removing minor words is problematic and changes the context and meaning of the words because the writing style uses a lot of negatives. Sentences begin with “Are not the. . . “ When the dataset is scrubbed of the minor words “the,” “and,” “is,” and “not,” the meaning is lost. Wittgenstein is reported to have written that “ordinary language does not necessarily have some perfect logical essence which analysis can reveal” (Robinson, 2002, p. 169).

Imagination. Imagination is described by Farmer as the postmodern analogue to modernity’s rationality; it entails images and the imagination, but is not confined to being described as art (Farmer, 1995, p. 158-9). What “shifts” in our thinking may result from using our imagination? What is imagination? Is imagination more or less? Farmer states what imagination is not: It is not as defined by Morgan (Farmer, 1995, p. 165).

Does imagination change according to what is being addressed? What rules surround the use of imagination as a postmodern perspective in decision-making? How can public policy and administration get beyond rule-making?

Imaginization, conceived differently than imagination, aims to free the public policymaker and public administrator from “magical thinking,” the toddler-sized version of “wishful thinking.” One such example is from a Joint Legislative and Audit Review Commission (JLARC) study of Medicaid physician supply that, finding little support in the research that rate influences physician supply, reifies economics:

Given the limited information to examine the effects of Medicaid rate changes in Virginia, the best available evidence is the national research summarized in this chapter that Medicaid rates have at least a modest effect on access to health care. The causal studies are also consistent with the results of physician surveys and secret shopper studies, and in accord with the basic economic principle that an increase in price should lead to an increase in supply. (JLARC, 2013, p. 60).

Yet, focus groups have found that rate increases are only one piece of a complicated problem (Long, 2013). Other factors influencing supply may have more impact on physicians’ decision-making, as will be shown below.

Three questions that can be used to encourage creative, imaginative thinking in public policy and administration are:

1. What policy or decision should be made if efficiency were not a concern?
2. What policy or decision should be made if rigid rules application were not in place?
3. What policy or decision should be made if the principles of free market economics did not apply to this decision?

Deconstruction. There are special complications with operationalizing deconstruction. First, Derrida's point with deconstruction was to get beyond operationalizing. Clear statements were what he was getting beyond. Farmer writes that Derrida said "All statements defining what deconstruction is or is not miss the point" (Farmer, 1995, p. 180). Paul Cilliers echoes this in his seminal work on complexity and postmodernism. Cilliers is an apologist for deconstruction but still sees a role for making claims, little claims, but maintains skepticism about big claims (Cilliers, 1998). Little claims are claims about low-level interactions or core functions of complex systems. Big claims would include the claim that all complex systems operate a certain way.

A second complication with operationalizing deconstruction is understanding the object of the deconstruction. What is being deconstructed? Is it efficiency or bureaucracy or something else? Farmer writes about deconstructing texts and gives a broad, all-encompassing definition of a text. As Farmer explains, a text can be a language, an action, a feeling, and actual textbooks. If "the reader writes the book," then how can deconstruction be operationalized? In public policy and administration decisions, some questions to ask might be:

1. In what ways is the policymaker or public administrator constrained from being objective in this decision?
2. In what ways can this decision be construed as a text?
3. How has the understanding of this problem changed? How will it change?
4. What are the binary oppositions in this problem?

Deterritorialization. Deterritorialization, as explained by Farmer in Chapter 12 of *The Language of Public Administration*, involves thinking in ways that are supra

to standard ways of thinking. He refers to the work of Lincoln and Guba, discussed previously. The almost natural response to processing information is to process it through previous experiences, through the ways one has been taught, in order to make sense of information. One could argue that the very way in which modern science is done, is a trap: In confining science to this way or that way, qualitative or quantitative, for example, much is lost. Pluri-disciplinarity can be thought of as one aim of deterritorialization.

Ways to operationalize deterritorialization can be the following:

1. How can the vocabulary of other disciplines inform understanding of the present policy question?
2. How can methods of many disciplines be combined to answer the present policy question?
3. How can the present policy question be approached in such a way as not to prefer one perspective over another perspective?

Alterity. Alterity is the ability to think in alternate realities. It is contrary to reflexive thinking, discussed in *The Language of Public Administration*. Instead of the binary oppositions of deconstruction, alterity seeks to make conscious an amorphous other, an opposition to the status quo (Farmer, 1995).

When Hannah Arendt reported on Adolph Eichmann's trial in his role as a Nazi death camp administrator, she characterized him as simply following orders; he was not thinking (Brokemper, Rexin, & Trotta, 2012). It was through this experience that Arendt began writing on the banality of evil. In observing Eichmann during the trial, Arendt was not pointing out the moral superiority of one side or the other, simply that the perceived other was not thinking. In breaking down barriers or boxes between the I and

the other, the human potential to simply follow orders is laid bare. An alterity which calls forth anti-administration has the moral upshot of valuing the other. True anti-administration would recognize thinking without thinking and discourage it.

Questions to operationalize alterity could be:

1. What or who is left out of this problem?
2. What persons or populations are obscured in the problem as presently constructed?
3. How should a public administrative agency conduct itself in relation to those they serve, be it a “client, a subordinate, a superior, or a bystander” (Farmer, 1995, p. 227).
4. How can the other have a voice in this decision?

The analytical results of Stage 4 indicate the inherent complexity in textual analysis. The challenge with identifying explicit themes in each of the post-modern perspectives, imagination, deconstruction, deterritorialization, and alterity, was outlined. An alternative approach, that of asking questions, was utilized.

Stage 5 represents the final stage of the Modified Hermeneutic Circle. It is approached through a gaming algorithm and agent-based modeling. The results of this stage will be illustrated using a practical policy problem, Medicaid physician supply.

Analytical Results of Stage 5

The perspectives explored from Stage 4 are imagination, deconstruction, deterritorialization, and alterity. There are two pieces to this question. The research question is: How can policymakers and public administrators incorporate multidisciplinary perspectives into decision-making? This question is actually two parts. The first part relates to how a particular administrator or administrators can increase

their creativity in policy decision-making by including multiple perspectives. The second part of the research question asks how a particular administrator or administrators can become willing to see things through new disciplinary perspectives.

The first question, how can a particular policymaker or administrator increase their creativity in policy decision-making by including multiple perspectives, is what will be examined here. For example, let us suppose the policy question is: How can Medicaid providers be incentivized to accept Medicaid patients? After briefly discussing the background for this question, the model will be built.

Medicaid Physician Supply as a Complex System. The U.S. healthcare system is an economic system that exists and operates in an environment of asymmetric information (Arrow, 1963). Physicians rely on patients to fully explain health conditions. Patients rely on physicians for information on all treatment options regardless of whether third party reimbursement is possible or sufficient. The Medicaid program, created in 1965, established the federal and state governments as the third party payer for qualifying low income adults and children. Because Medicaid is administered by the states, each state has some latitude for designing policy choices to meet program goals. And it means that each state as the third party payer must ensure that physician supply is adequate to demand. The Affordable Care Act (2010) further complicated this responsibility through the expansion of Medicaid to childless adults. Physician supply was already strained, now it has become even more strained through increased demand. Researchers have sought to explain physician supply through surveys and economic studies. This paper asks seeks to better understand physician supply and related policy options through a complex systems approach.

The broad research question is how can policymakers and public administrators incorporate multidisciplinary perspectives into decision-making? What can be learned from differing policy choices among states? This question is illustrated by examining the incentives needed to increase primary care physician (PCP) participation in Medicaid. Put another way, how can policymakers incentivize PCPs to accept Medicaid patients? This question will be addressed with a gaming algorithm and with an agent-based model.

A Gaming Algorithm. This can be based on a game in the sense that multiple parts are interacting to achieve a solution. The game can be distilled logically. The objective of the game is to come up with a solution set of possibilities instead of a single answer to a single problem. If this game were to be programmed, one can think of writing a program that includes one or more algorithms or decision-rules. The algorithm begins with a space where all parameters are set to null. That is to say that in initializing the problem, all parameters begin with no value. In the simplest form of the model, there is one decision-maker, one discipline, one choice, and one policy question. In the simplest form of the model, one public policymaker or public administrator is answering the question: he or she is known as the Decision-Maker (DM). In this simplest form of the model, the DM is aware of, possibly trained in, one discipline, let us say economics. The discipline in this case is economics. The DM then may propose one and only one choice: to increase reimbursement rates. This model is outlined in Table 4.10.

Table 4.10

Model 1: The Simple Model

Component	Number	Description
Decision-maker (DM)	1	Number of policymakers or public administrators making the decision
Discipline	1	Number of disciplines influencing the decision
Policy choice (PC)	1	Number of policy choices available to the DM
Output for this case: One DM, influenced by economics, decides to incentivize providers to see Medicaid patients by increasing reimbursement rates.		

This simple form of the model is not characteristic of the real world but is intended to show the model in a rudimentary way in order to build on it. Model 2, shown in Table 4.11, introduces interaction among the DMs.

Table 4.11

Model 2: Model 1 with more than one DM

Component	Number	Description
Decision-maker (DM)	> 1	Number of policymakers or public administrators making the decision
Discipline	1	Number of disciplines influencing the decision
Policy choice (PC)	1	Number of policy choices available to the DM
Output for this case: Multiple DMs, influenced by economics, decides to incentivize providers to see Medicaid patients by increasing reimbursement rates.		

Model 3 builds on Model 2 by adding more than one discipline. This is shown in Table 4.12.

Table 4.12

Model 3: Model 2 with more than one discipline

Component	Number	Description
Decision-maker (DM)	> 1	Number of policymakers or public administrators making the decision
Discipline	> 1	Number of disciplines influencing the decision
Policy choice (PC)	1	Number of policy choices available to the DM
Output for this case: Multiple DMs, influenced by economics and business perspectives, decide to incentivize providers to see Medicaid patients by increasing reimbursement rates.		

In Model 4, the DMs update their decision based on information received in the implementation of the original decision. Table 4.13 shows Model 4.

Table 4.13

Model 4: Adaptation

Component	Number	Description
Decision-maker (DM)	> 1	Number of policymakers or public administrators making the decision
Discipline	> 1	Number of disciplines influencing the decision
Policy choice (PC)	> 1	Number of policy choices available to the DM
Output for this case: As reimbursement rates are shown not to increase the number of providers who will see Medicaid patients, DMs consider other policy choices.		

The consideration of policy choices through multiple perspectives is critical if policy science hopes to make an impact in real-world decisions. Epistemic pluralism is of catalytic value in achieving those aims. Model 3, even with multiple decision-makers,

still considers one policy choice: increasing reimbursement rates. And Model 4 did not consider other policy choices until increasing reimbursement rates were shown not to work.

The interplay between the levels of decision-makers, disciplines, and policy choices, a gaming algorithm, can be thought of as Variable Level Policy Modeling. It begins in a rudimentary form and becomes more complex as more decision-makers, disciplines, and policy choices are introduced. Variable Level Policy Modeling can occur in an analog format, as shown in this example, or a digital format.

Using Variable Level Policy Modeling to uncover the complexity of Medicaid physician supply is more than a theoretical exercise. Numerous studies have shown that reimbursement rates are insufficient to incentivize providers to see new Medicaid patients. In the State of Washington, researchers convened focus groups to find out just what drives doctors to see or not see Medicaid patients and the answers had more to do with complexity of illness and showing up for appointments than previously thought (Long, 2013). Therein is another difficulty: it is difficult to know how other states are implementing federal initiatives.

Agent-Based Modeling. The above tables address the policy question in an analogue format, a format easily translatable to computer code. Another way to approach the problem is through agent-based modeling. Agent-based modeling is seen as a highly regarded method for complexity science research (Arthur, 2014; Wilensky, 1999). As mentioned earlier in this chapter, a complex system can be said to be comprised of component parts, interaction, behavior, and rules for adaptation. The parts consist of the components of the parameter space or agents – public policymakers or public administrators – the number of disciplines, herein referred to as perspectives

is another component part. Agents interact with each other as they try to come to consensus. How an agent will solicit agreement with other agents depends on the agent's relative position in the organization. (Organization here means public administrative agency.) If an agent is the director of the agency, they have more autonomy. If an agent is one of many administrators working on a problem, it is assumed they have less autonomy. Placement matters. Behavior is also part of the model. Agents may not be open to considering a problem through multiple perspectives; a specific agent may want to consider only one perspective. If an agent wants a promotion, they may be less-likely to bring in outside perspectives and instead be focused on budget maximization and efficiency. Finally, there are rules for adaptation. Agents may continually update as they get more information and as they see the reaction of other agents. These are shown in Table 4.14.

Table 4.14

Components of Agent-Based Models

Component	Description	For this case
Parts	Agents	PCPs, Medicaid patients
Interaction	Agents interact with each other	PCPs and Medicaid patients are continuously interacting
Behavior	Agents make choices	PCPs who have previously seen Medicaid patients may not want to continue seeing Medicaid patients; Medicaid patients may choose to shop among Medicaid providers; there is some memory to these choices
Rules for Adaptation	Agents may continually update as they get more information and see the reaction of other agents.	PCPs may respond to policies differently. PCPs may continually adapt to changing policies.

The model will consist of a parameter space of providers and patients. The behavior of doctors and patients will change in response to policy options. The objective of the model is to identify policy options resulting in the most number of participating PCPs.

The broad research question this study addresses is how policymakers and public administrators can incorporate multidisciplinary perspectives into decision-making? What can be learned from differing policy choices among states? This question is illustrated by examining the incentives needed to increase primary care physician (PCP) participation in Medicaid. Put another way, how can policymakers incentivize PCPs to accept Medicaid patients?

The model consists of a parameter space of providers who are linked in a social network. The network can be an informal referral network, a friendship network, or a network linked by ties to a professional association. The objective of the model is to determine the size of the network which will optimally produce the most number of physicians willing to see new Medicaid patients, given varying numbers of PCPs in the network and a varying percentage of PCPs who start with the initial condition of willing to see Medicaid patients. The number of PCPs in the network is manipulated as is the number of physicians who will see new Medicaid patients.

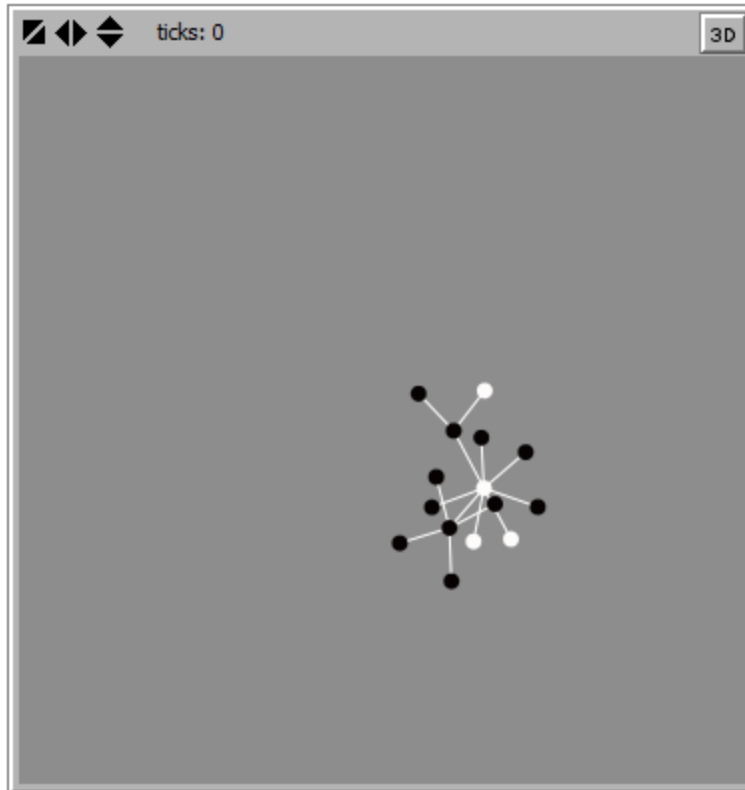
According to the literature, the number of PCPs willing to see new Medicaid patients is approximately 30% (Decker, 2012). This figure varies by location and state. For example, in California, a majority of PCPs will see new Medicaid patients. New Jersey has the lowest percentage of providers who will see new Medicaid patients.

The model assumes there is interaction between PCPs who will see new Medicaid patients and those who will not. Adaptation is also part of the model: It is assumed that PCPs who are part of networks in which the majority see new Medicaid patients, will themselves decide to see new Medicaid patients.

The system being modeled is the landscape of PCPs as they interact with one another. NetLogo is an existing programming tool commonly used for similar analyses (Wilensky, 1999). The particular model is an extension of an existing model in the NetLogo Model Library, Language Change. The Language Change model was used for modeling the adoption of language changes among English speakers. It was also used to model management innovation.

There is no existing literature using a computational technique to explain physician supply. For that reason, the model is simply stated. As parts of the model are tested and verified, additional features will be utilized. Figure 4.1 is an example of the starting configuration and final results for a network with 15 nodes and a percent willingness of 33%. Black nodes represent the initial condition of unwillingness. White nodes are the percent willing to accept new Medicaid patients as a starting condition.

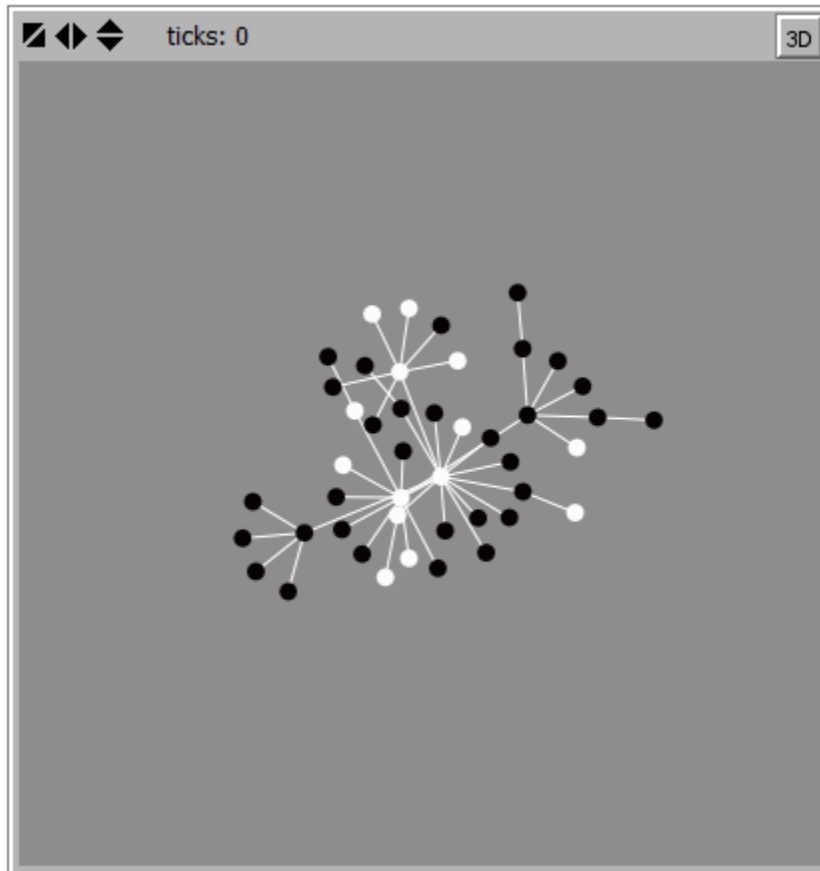
Figure 4.1 NetLogo Work Space – 15 Nodes



- 30 runs
- Converged to willing in 9 runs, not willing in 21 runs
- Network converged to 100% willing in an average of 6.7 ticks
- Converged to 100% not willing in an average of 4.4 ticks

Figure 4.2 is an example of the starting configuration and final results for a network with 45 nodes and a percent willingness of 33%.

Figure 4.2 NetLogo Work Space – 45 Nodes



- 30 runs
- Converged to willing in 9 runs, not willing in 21 runs
- Network converged to 100% willing in an average of 6.7 ticks
- Converged to 100% not willing in an average of 4.4 ticks

Agent-based Modeling Results. The model was run four separate times of 30 runs each. The four runs consisted of varying both the network size and the percent willingness to see new Medicaid patients. The results in Table 4.15 indicate that size of the network is not material to PCPs' willingness to see new Medicaid patients. However, the starting probability of percent willingness does determine the number of PCPs deciding to see new Medicaid patients.

Table 4.15

Agent-Based Modeling Results

No. PCPs	%Willingness	Willingness	Convergence (runs=30)	Ave. Ticks
15	33%	1	9	6.7
15	33%	0	21	4.4
45	33%	1	8	42.1
45	33%	0	22	43.2
15	50%	1	15	9.3
15	50%	0	15	14.7
45	50%	1	12	41.2
45	50%	0	18	44.9

PCPs are more willing to see new Medicaid patients when a greater percent of providers in their network see new Medicaid patients – converges to 1 more quickly as well.

Summary of findings. The Physician Supply model can be thought of as having the same features of a rumor spread model but with some important distinctions. One distinction is that with a rumor, the condition is not permanent. The agent can forget about the rumor. When deciding to accept new Medicaid patients, that decision cannot be forgotten. It shapes many features of a physician's practice from appointment scheduling to claims filing. In addition, it may be difficult for a physician to discontinue

seeing a Medicaid patient. Further investigation of this model is needed, especially as it concerns network structure and size. Do doctors entering into the network prefer to associate themselves with a provider considered a “hub” of connections? Would connection to a “hub” be more powerful than the percent willingness?

This chapter reviewed the analytical results of Stages 1 through 5 of a modified hermeneutic circle. Stage 1 identified the philosophical underpinnings of this study. Stage 2 showed that the philosophical underpinnings were connected through a Wittgensteinian Family Resemblance. Stage 3 located the identified categories in David John Farmer’s epistemic pluralism corpus. Stage 4 operationalized the categories to the extent possible. And Stage 5 built both a gaming algorithm and an agent-based model as two distinct approaches to answer a policy question. The next chapter analyzes PPA in its big data context using imagination, deconstruction, deterritorialization, and alterity as operationalized in this chapter.

CHAPTER 5

ILLUSTRATING POSSIBILITIES OF EPISTEMIC PLURALISM

PUBLIC POLICY AND ADMINISTRATION IN ITS BIG DATA CONTEXT:

THE NARRATIVE OF THE UNCONSCIOUS

The subtitle for this chapter is “the narrative of the unconscious” because it follows the chapter explaining analytical results: the narrative of conscious effort to discover and explore what is immediately visible and in one’s physical space. Are there also unconscious aspects to discovery that EP will help uncover? To illustrate this, public policy and administration will be examined in its big data context through the perspectives of imagination, deconstruction, deterritorialization, and alterity. First, a discussion of the unconscious.

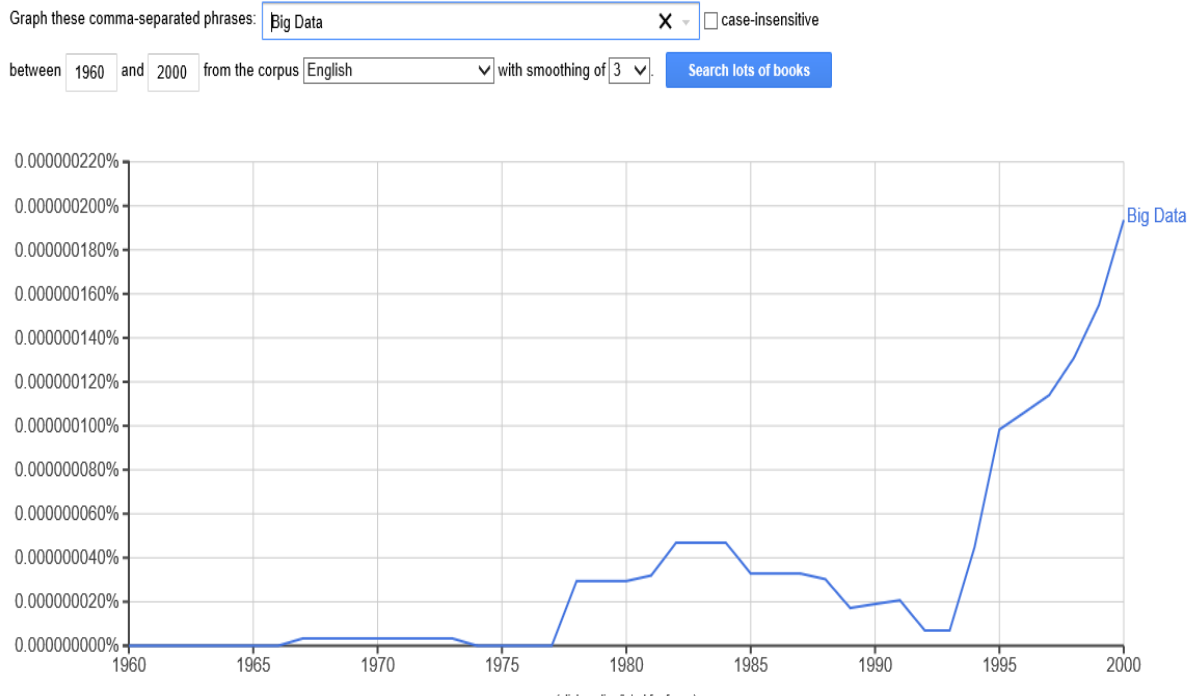
Robert Burton, in his 2008 book, *On Being Certain: Believing You are Right Even When You’re Not*, discusses the origins of knowledge or feelings about being right. It is Burton’s work that illuminates the BPSS model discussed in Chapter 1. As a neurologist, Burton describes the physiological, brain-based origins, genetic origins, and the interactions necessary to create the “feeling of knowing.” This is important to Chapter 5 because it speaks to the heart of how we know what we know and the limitations of such knowing.

The difficulty with studying unconscious thought is that one must be aware of unconscious thoughts, a logical impossibility. But it is possible for experiments to illuminate unconscious thought and Burton outlines a few. The idea that the

unconscious can have a role in PPA, and more specifically, in decision-making, is a radical idea that deserves to be examined. Burton reviews neural networks in computer science and then applies those concepts directly to the brain. He describes neurons as fixed but ever-changing and adapting in response to various external forces. In his discussion of neural networks he explains the so-called hidden layer. This is not a discrete part of the brain but is meant to describe what happens between inputs and outputs. As Burton illustrates, there can be many inputs and fewer outputs, modulated by this layer. “It is in the hidden layer that all elements of biology . . . all past experience . . . affect the processing of incoming information” (Burton, 2008, p. 45). The hidden layer is similar to the machine learning algorithms employed by Amazon.com. Burton’s work provides evidence of the role of the unconscious in decision-making. The case study considered here is big data.

Why big data? At the 2014 Joint Statistical Meetings, more than 23 sessions were convened to discuss big data. The U.S. government has recognized big data enough to initiate a big data research agenda. A report to the president, *Big Data: Seizing Opportunities, Preserving Values* was published in May 2014. This initiative has translated into more than 80 other federal government initiatives. Figure 5.1 shows the use of the term “big data” in the Google Books corpus. It has doubled since the mid-1990s.

Figure 5.1 Big Data in Google books Ngram Viewer



This chapter examines big data using the four post-modern perspectives of imagination, deconstruction, deterritorialization, and alterity.

Imagination

In Chapter 4, we identified three questions that might be used to imaginize about policy questions. Put in a big data context, the questions are:

1. What big data policy or decision would I make if efficiency were not a concern?
2. What big data policy or decision would I make if rigid rules application were not in place?
3. What big data policy or decision would I make if the principles of free market economics did not apply to this decision?

What if efficiency were not a concern? If efficiency were not a concern,

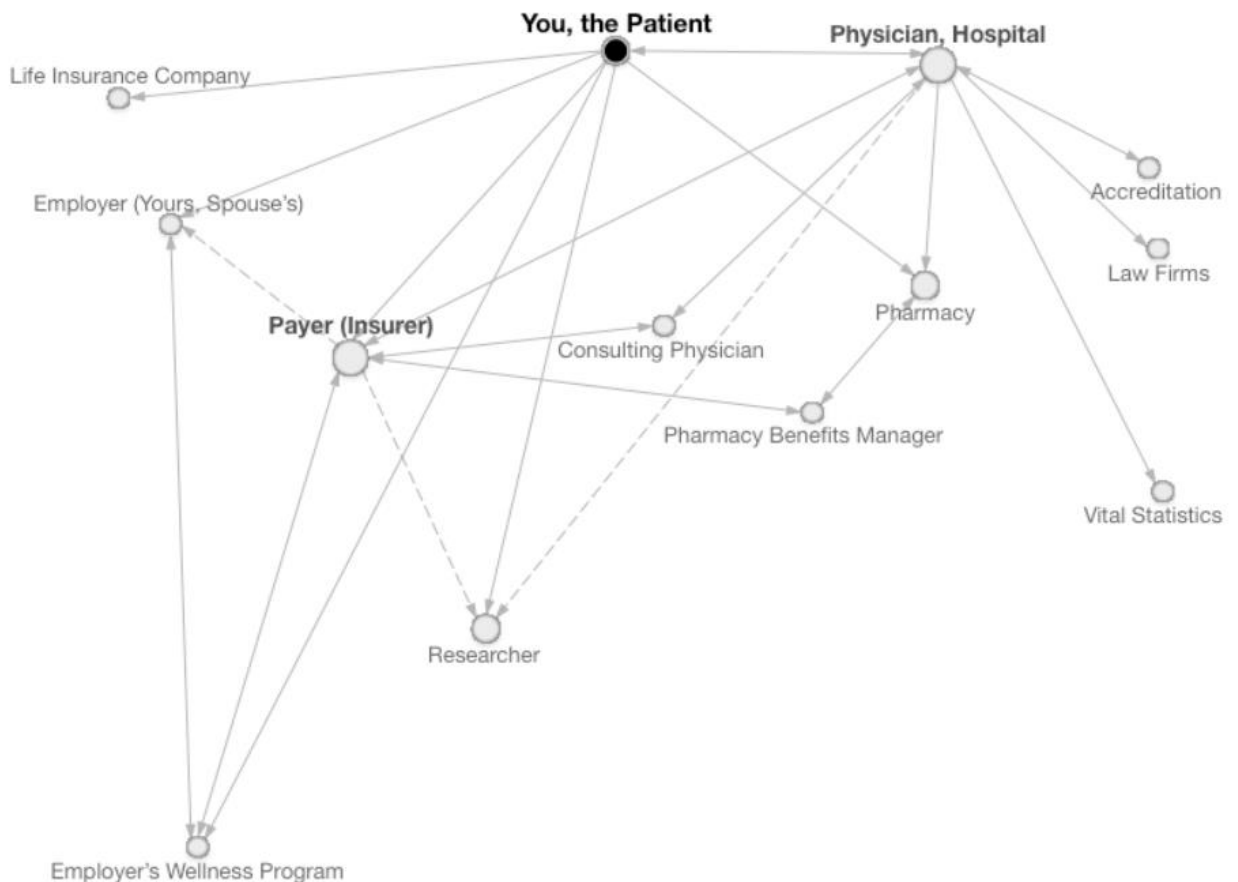
there could be a real conversation about who is being empowered by big data, and about who is making money from big data. We could be creative about questioning the truth of the following statement from the President's report: "Big data technologies will be transformative in every sphere of life" (Executive Office of the President, 2014). The imagination allows us to question claims in the report such as that big data "enhances accountability and privacy." What is meant by accountability? What is meant by privacy? Imagination in big data may ask for real answers and real action. Real action could be such initiatives as allowing consumers to opt-out of privacy regulations, such as those exemplified in the film *Terms and Conditions May Apply* (Hoback, 2013). When efficiency is not a concern, policymakers, public administrators and others can have a meaningful conversation about the digital divide.

What if rigid rules application were not in place? Imagining a big data world without rigid rules may mean that anonymized data is freely available to everyone, especially persons whose data is included in a big dataset. There may be no need for organizations to utilize a Data Use Agreement or a Memorandum of Understanding in order to use the data of another organization.

What if the principles of market economics did not apply to big data? Arthur argues that "economics' adherence to equilibrium analysis quickly settles to a place where no agent has an incentive to diverge from its present behavior" (2013, p. 13). Indeed, much of the study of economics is built around what happens and what causes departure from equilibrium as if equilibrium is the assumed, steady state condition. Chang (2010) and Kay (2004) are two economists that claim the free market is a myth. If there were such a departure from reliance on a free market economy, might it be that internet access is treated as a public good? Or that persons whose data is used

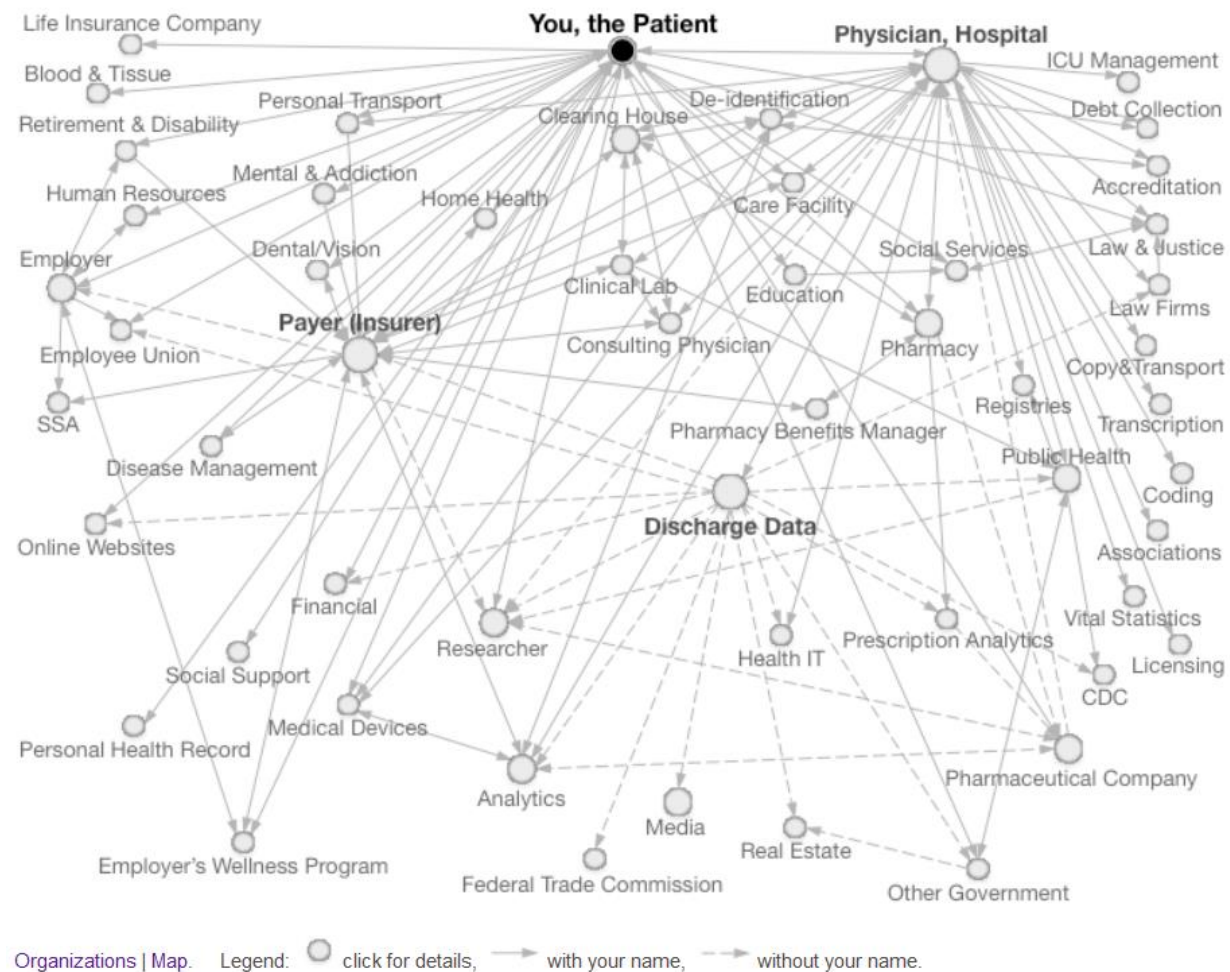
by for-profit companies get some ability to consent. Harvard University's Data Privacy Lab created a map depicting healthcare information data flows for a hypothetical patient in 1997 and today. The 1997 map is shown below.

Figure 5.2 Tracing the Data in 1997



(Source: thedatamap.org). The following map shows healthcare information data flows today. It is not known whether the entities in the map sell the information to for-profit companies or whether restrictions apply. The President's report discusses anonymizing data and how researchers are still able to re-identify persons in only a few steps of an algorithm.

Figure 5.3 Tracing the Data in the 2010s



All the places your data may go.

Special Focus: Discharge Data

(Source: thedatamap.org)

Public policymakers and others are called upon to be creative and imaginative when protecting private health information. Imaginizing might include being aware of boundaries that exist and understanding that data are not circumscribed by boundaries.

Deconstruction

When operationalizing ways to think about deconstruction in its big data context, it may be useful to ask the following questions from Chapter 4.

1. In what ways are policymakers, administrators and others constrained from being objective in big data decisions?
2. Can big data be construed as a text?
3. How has understanding of big data changed? How will it change?
4. What are the binary oppositions in big data? How can policymakers, administrators, and others get beyond binary oppositions in big data?

Using the fourth question, one can ask: What is recognized about big data? What is unrecognized about big data? What is left out when considering the binary oppositions of the recognized and unrecognized?

What is recognized about big data? A Derridian understanding of big data might be that big data is writing. There are words, elements in datasets. Datasets are then analyzed either through writing ad hoc computer code or using existing computer algorithms. These techniques are used to see what is compelling about the data. Derrida noted that writing was about distance, delay, opacity, and ambiguity (Farmer, 1995). Is big data about these things? Yes, big data is about distance. There exists a definite distance between the object studied, on whom or what the data is collected, the person compiling the dataset, and the person or machine analyzing the dataset. Big data is about delay. There is also a delay from the time the information is collected to the time it is analyzed. Big data is opaque. Often with data, documentation is missing or never created in the first place. This leads to opacity. It may not be known why an element was collected or what it means. Why is it important to the dataset? Sometimes the researcher may not know. Big data is ambiguous. Much is ambiguous in datasets. Context is often hard to discern. These difficulties with big data, distance, delay, opacity,

and ambiguity, may exist for all sizes of datasets. If these qualities are not unique to big data, versus small data, then what is recognized to be uniquely big about big data?

Big data may mean that the data is too voluminous to be analyzed with standard software programs. It may also mean lots of records. How many records are enough to declare with precision that X dataset is big data? Is it measured by the number of records or number of variables? What counts as big data? Big data gets support from Google, Amazon, Microsoft, and Twitter.

What is unrecognized about big data? It is easy to ascribe religious characteristics to big data. Big data can save scholars from classical, and often difficult to understand, statistical techniques. Big data is elevated above all other data. And, like religion, it offers itself for researchers' continual archeological excavation. Big data can be excavated in an infinite regress. Big data can be deconstructed. Can researchers question big data without appearing to question big data or appearing Anti-big data? What might exist at the fault lines of big data? What is the risk of defining big data? A limitation might be attempting to contain big data. Researchers rely on an appropriate distance between themselves and objects of study. But researchers may be convinced of the possibility of big data without considering its limitations. Who decides what elements are part of big data? If the origins of big data are with technology companies who are for-profit, might they have an influence on how big data is used, analyzed, and disseminated? Big data is most likely my data and your data. What moral questions exist when selling or analyzing my data and your data? What governing body makes those decisions?

What is left out of a recognized/unrecognized opposition? The recognized/unrecognized binary opposition does not take into account the blind spots of

big data. Yet, deconstruction invites and requires exploration of “intermediary zones” in binary oppositions (Peeters, 2014, p. 454). Could big data be shaping research agendas? Federal research agendas are shaped by funding. With \$200 million towards funding big data, this is sure to be the case (Executive Office of the President, 2012). Could it not also be that non-profit funding is also shifting toward big data?

Privileging the unrecognized. Derrida suggested one way to deconstruct was to privilege the inferior term in a binary opposition. In this case study, the unrecognized aspects of big data would be privileged. Can big data be discussed objectively? If so, how? Does big data get us to greater understanding of ourselves? If so, how? Does big data leave out the BPSS model? What might the potential misuse of big data look like? Would we be able to recognize it? Finally, is big data an entrapment? Does it cause us to depersonalize so that we treat others and ourselves as bits of information or information gatherers and disseminators? People can become commodities in a big data world. If we deconstruct, we see that big data can benefit from a “clearing away of metaphor – of the knowledge that big data is beyond question and makes the researcher ‘right and beyond rebuke’ ” (Farmer, 1997, p. 17-19)

Deterritorialization

When discussing imagination previously, the suggestion was made to be aware of boundaries in big data. In an analog world, without digitizing bits of information, it may be easier to identify boundaries and to keep information within boundaries. This becomes harder with big data. The President’s report compartmentalizes the big data discussion into education, homeland security, law enforcement, and privacy law but data know no boundaries.

Questions for examining big data through a deterritorialization lens include:

1. How can the vocabulary of other disciplines inform understanding of big data?
2. How can methods from many disciplines be combined to answer questions about big data?
3. How can I approach big data in such a way as not to prefer one big data perspective over another?

Alterity

What would thinking look like in a big data context? Might there be a tendency to dismiss capturing data that might be unflattering to public administrative agencies? Would there be a tendency to follow rules and toward thinking in administrative boxes? Ownership of data might be a concern. True alterity would involve breaking down boundaries and barriers, even those regarding data.

Questions to ask when thinking about big data through an alterity lens include:

1. What or who is left out of big data datasets, policy, or decision-making?
2. What persons or populations are obscured in big data as presently constructed?
3. How should a public policymaker or public administrator conduct herself or himself in relation to those they serve?
4. How can the “other” have a voice in big data decisions?

The final question above, how can the other have a voice in big data decisions?, calls for an openness between the governor and the governed. In this big data world, there is transparency of data, of decision-making, of ownership, and of profit. One person or group of persons is not privileged. All have an equal say. Doing away with privileging

efficiency means there is time to hear and listen to all constituents. Communities are empowered.

In this Chapter, we examined PPA in its big data context through the post-modern perspectives of imagination, deconstruction, deterritorialization, and alterity. These lenses offer a way to get beyond bureaucratic efficiency and instead expand understanding of public policy questions. Rather than answering questions, such as Should people have access to their data?, this Chapter asks questions to bring about creative solutions to policy questions. Expanded understanding is necessary to move beyond unconscious tendencies such as privileging efficiency and one right answer. Imagination calls for shifts in thinking to allow creativity to emerge. Deconstruction inverts binary oppositions by privileging the one with perceived lower value. Deterritorialization calls for elimination of boundaries, artificial as they may be in a big data context. And alterity is a radical way of interacting with government: non-hierarchical in nature and fully lateral.

This chapter discussed PPA in its big data context in an analogue format. The next chapter discusses extending such a format to the cloud and implications for PPA.

CHAPTER 6

PARAMETERS OF COMPLEXITY

This chapter builds on the prior chapters. In Chapter 4, it was shown that EP provided a valuable link between theory and theory, by informing understanding of macro-level categories, e.g., science and systems. Chapter 5 built on this link and studied it in PPA's big data context, applying theory to practice by viewing big data through the perspectives of imagination, deconstruction, deterritorialization, and alterity. EP also provides a valuable link between practice and practice. One way to achieve this practice-practice link is to ask questions such as, How can managing be upgraded? One way managing can be upgraded is to extend EP to the cloud. This chapter discusses the "cloud," the relevance of cloud-based PPA, the possibility of extending EP to the cloud, and implications for PPA.

What is the Cloud?

As discussed in Chapter 2, the cloud is a loose term for describing computer tools and information that is housed in a server apart from a personal computer's central processing unit. The cloud is accessed through broadband networks. Computational speed depends on the speed and type of broadband network. Ince (2011) points out that cloud computing allows the user to operate the computer as if it is isolated, standing alone from other computers, when, in fact, the computer is connected to vast amounts of information. Access to the information depends on the user's knowledge of what is available in the cloud, the user's skill level to access the data, but also on the user's

access privileges. There are many sites, such as data.gov, where data is available free and open to anyone who knows how to download it. There are also many sites where the user must have access privileges, such as the many sites containing veterans affairs data (Maynard & Chapko, 2004).

What is the Relevance of Cloud-Based Public Policy and Administration?

Cloud-computing has relevance to PPA from the citizen's perspective and from the policymaker's and public administrator's perspective. Electronic government may be familiar to the reader as the consumer of services. From the citizen's perspective, according to executives at Google, cloud-computing

reinforces the permanence of information. . . Near permanent data storage will have a big impact on how citizens operate in a virtual space. There will be a record of all activity and associations online, and everything added to the Internet will become part of a repository of permanent information.

(Schmidt and Cohen, 2013, p. 55)

Yet, cloud-based PPA offers an opportunity for public policymakers and public administrators, faculty, students, and others to link with others addressing the same or similar questions. Cloud-based PPA goes beyond consumption by citizens into expanded understanding through thinking about problems through multiple perspectives and connecting with others who are doing the same.

Jim Gray, a researcher from Microsoft wanted more than reporting of information. According to Ince (2011), Gray envisioned a fourth paradigm of research. In addition to empirical approaches, statistical approaches, and computer-based modeling approaches, Gray proposed ways to connect research data together so that researchers working on a problem could have visibility to all other research on that

problem. Gray wanted the final research product connected but also the data used to develop the final research (Ince 2011).

Extending Epistemic Pluralism to the Cloud

System design is critical in extending epistemic pluralism to the cloud. Systems can be designed around a dataset of answers or they can be designed as an online community.

Datasets of Answers. Cognitive computing represents a plausible way to extend epistemic pluralism to the cloud. IBM leases Watson to any developer willing to pay the hourly fee. When asked a question, Watson can come up with one or more answers, all presented with a confidence level. This same computer logic has been used by the Metropolitan Opera to help those buying tickets. Opera aficionados can determine which opera, among the operas offered during the season, best suit their tastes. And Amazon presents buyers with a list of possible alternative choices in a buying decision. IBM Watson, the Metropolitan Opera algorithm, and Amazon.com share at least one characteristic: there is a database pre-built with specific answer choices. In a discussion of complexity in public policy making, Arthur (2013) points out that technology is decades away from constructing a decision-making tool that allows for all possible answer choices. In his most recent work, Arthur (2014) envisions artificial-intelligence-based computers with semantic knowledge of past policy system failures. Such a computer could then search the cloud for “analogous” situations to present policy questions and return valuable information (Arthur, 2014, p. 12). The point of epistemic pluralism is not to choose among a set of predefined choices, but rather to develop new knowledge and expand creativity. A cloud-based tool that output specific policy choices would be counter to the intent of epistemic pluralism, however a

cloud-based tool of past policy failures should stimulate creativity in the search for possible solutions.

Online Communities. Another possible way to create cloud-based epistemic pluralism is to develop an online community. Communities exist for federal policymakers and could exist for students, faculty, and public administrators in making decisions through multiple lenses. The online community could be arranged by subject matter but every listing could be cross-listed with all other subjects. For example, if the policy question is, how can policymakers encourage social service beneficiaries to go to the doctor, the answers could range from the neuroscience perspective, paint the walls a welcoming color, to the business perspective, provide reliable bus service.

Implications for Public Policy and Administration

The Gravitational Pull of Specialization. There is a tendency toward specialization in PPA. Agent-based modeling cannot be conducted without precisely specifying the problem. Arthur (2014) describes agent-based models as having limited flexibility because they are initialized with preset starting values and conditions. In this way, they are two-dimensional and may limit what can emerge. Questions such as, “What factors influence Medicaid-enrolled physician’s decisions to see new Medicaid patients?” are not narrow enough. Specifying the problem to its smallest bit is a necessary part of agent-based modeling. As already mentioned above, agent-based modeling is the methodology of complexity science. And therein lies a conundrum. Complexity science is itself post-modern, and aims to make up for the weaknesses of modern reductionist science (Cillers, 1998). However, if agent-based modeling is indeed the method for doing complexity science, it does not. What is left out when a question is narrowed such that all else equal is the crucible of the problem? Does complexity

require imagination, deconstruction, deterritorialization, and alterity? One could argue that it does precisely in order to go beyond the gravitational pull of specialization.

Wittgenstein X as Example. This research illustrated two ways to address a policy question. The first way was through a gaming algorithm. The second way was through an agent-based model. The gaming algorithm was deliberately rudimentary: it aimed to build the model bit by bit. Wittgenstein X is a higher level version of the gaming algorithm. With Wittgenstein X, a policy or statement is examined and questions are asked through multiple perspectives. Wittgenstein X, the practical application of epistemic pluralism, is developed in detail in *Public Administration in Perspective*. Returning to the example of Medicaid physician supply, the policymaker could ask: How can Medicaid physician supply be upgraded? The answer with the gaming algorithm was that it could be upgraded either through higher level interaction of decision-makers and subject matter or through increasing the size of the provider network. Wittgenstein X takes the question further and explores how multiple perspectives can upgrade the physician supply. Through an economics lens it might be to consider altruism as part of economics. Might physicians want to help the poor? How can policy be developed that encourages Medicaid physicians to help the poor? Possibly through incentives to locate in underserved areas, or expedited loan repayment for physicians who treat blocks of Medicaid patients. A neuroscience lens might add to understanding why Medicaid patients may cancel doctor appointments. Could it be that a doctor's office is cold and unwelcoming?

Wittgenstein X incorporates language-games and complexity in getting to new knowledge. It is not easily analyzed and analytical techniques to demonstrate its usefulness are not available. But it represents a new way, a postmodern way, to make

decisions beyond the constraints of analytical techniques. Wittgenstein X represents a tool to operationalize epistemic pluralism.

Can we show that epistemic pluralism expands understanding? One mathematical pursuit is to use calculus to illustrate how epistemic pluralism does indeed expand understanding. Returning to the XY-coordinate plane from Chapter 1 where the New Frontier of PPA Thinking and Practice was illustrated, if instead of a choice between levels of outputs, we construct the XY plane so perspectives are the independent variable or X, and choices are the dependent variable or Y, epistemic pluralism can be modeled mathematically. The following are taken to be assumed:

- 1 . There are zero-to-many perspectives we will call x. $x = [0, \infty]$
2. There are zero-to-many choices, or solutions, we will call y. $y = [0, \infty]$
3. There is not a single optimal solution but rather more choices result from using more perspectives. This may be a one-to-one relationship, meaning for every additional perspective considered, there is one additional choice imagined. That function would be $y=f(x)$ where x in $f(x) = x$. A table of inputs and outputs is displayed below:

Table 6.1

Inputs and Outputs for $y=x$

Perspectives (x)	Choices (y)
0	0
1	1
2	2
3	3
n	N

The function could also be exponential, meaning that for every input, or every perspective, our solution set grows in a nonlinear manner. This function would be $y=f(x)$ where x in $f(x)$ is the value x^2 . The table is below:

Table 6.2

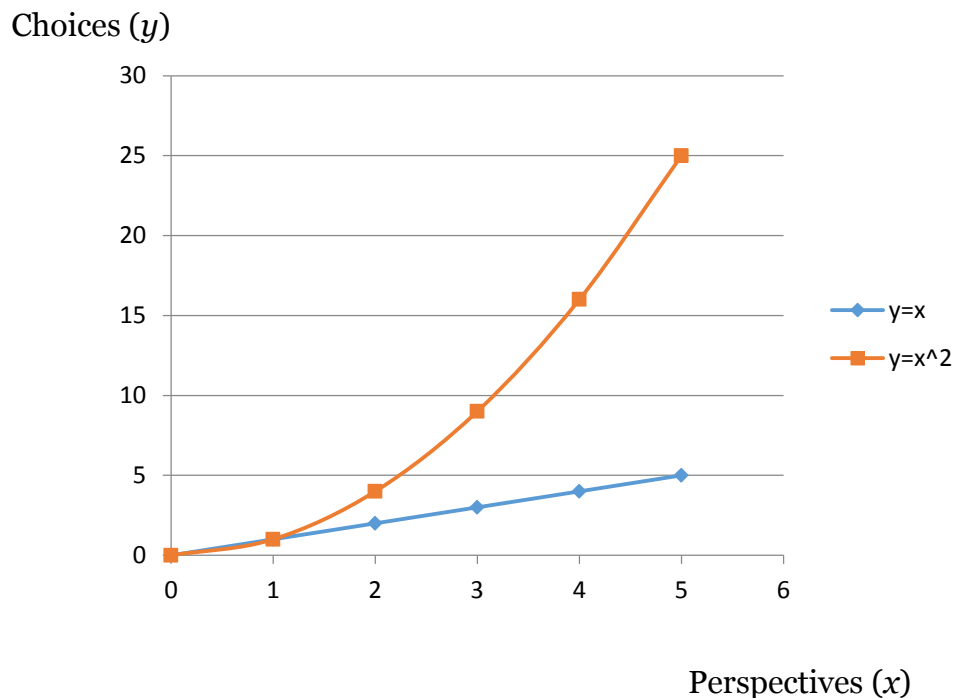
Inputs and Outputs for $y = x^2$

Perspectives (x)	Choices (y)
0	0
1	1
2	4
3	9
n	N

The second function, $y=x^2$ makes intuitive sense: Using one additional perspective in a decision-making process need not be constrained to an outcome of producing only one more choice. The true function may be something not less than $y=x$, over the domain of positive and increasing perspectives. That the domain is positive makes sense: perspectives do not have the ability to reduce the solution set of possibilities. That the domain is increasing also makes sense: the study question involves expanding understanding through the catalytic value of epistemic pluralism, not decreasing understanding. The third alternative for a function is that it is constant. However, there is no information suggesting that the relationship between x and y , as defined above, is constant.

Figure 6.1 below is a graphical depiction of the functions.

Figure 6.1 Functions of Perspectives and Choices



The conclusion by visual inspection is that the area under $y=x^2$ is greater than the area under $y=x$ but calculus should be used to confirm it. Definite integrals are used to compute area. The formula is given by: $F(b) - F(a) = \int_a^b f(x)dx$.

For the function $y=x^2$, we have: $\int_0^5 x^2 dx = F(5) - F(0)$. Using the formula for finding the antiderivative, $\int x^n = \frac{x^{n+1}}{n+1} + C$ ($n \neq -1$), the antiderivative of $x^2 = \frac{1}{3}x^3$.

$F(5) - F(0)$ can be written as $\left[\frac{1}{3}x^3\right]_0^5$. The area is then

$$\begin{aligned} \int_0^5 x^2 dx &= \left[\frac{1}{3}x^3\right]_0^5 \\ &= \left(\frac{1}{3}(5)^3\right) - \left(\frac{1}{3}(0)^3\right) = \frac{125}{3} - 0 = 41.7 \text{ units} \end{aligned}$$

For our second function, we have $\int_0^5 x \, dx = F(5) - F(0)$. Again using the formula for finding the antiderivative, $\int x^n = \frac{x^{n+1}}{n+1} + C$ ($n \neq -1$), the antiderivative of $x = \frac{1}{2}x^2$.

$F(5) - F(0)$ can be written as $\left[\frac{1}{2}x^2\right]_0^5$. The area is then

$$\begin{aligned}\int_0^5 x \, dx &= \left[\frac{1}{2}x^2\right]_0^5 \\ &= \left(\frac{1}{2}(5)^2\right) - \left(\frac{1}{2}(0)^2\right) = \frac{25}{2} - 0 = 12.5 \text{ units}\end{aligned}$$

The area under the curve of $y = x^2$ is more than three times as large as the area under $y=x$. There is a nonlinear, increasing effect from using multiple perspectives.

Implications for future complexity research. A claim of this research is that sometimes scientific reduction in order to solve problems is not the best approach. And complexity science, as defined herein, aims to remedy that problem by changing the emphasis in modern science from reduction to emergence. But there is a trap with complexity science inasmuch as it focuses on one method to study problems: Agent-based modeling can be seen as a form of scientific reduction. And as seen in this study, agent-based modeling can be viewed as two-dimensional. But what is known about EP, what was demonstrated in the previous section, is that it results in more possibilities: an expanded solution set results from expanded understanding.

While the previous section examined the area under the curve to demonstrate the usefulness of EP, another approach would be to analyze EP as the analog to time in time dilation. Time dilation is a theoretical concept, now proven, that shows that time is clocked differently depending on one's perspective. Can it be that understanding is different depending on one's perspective? Can EP be shown to have a dilating effect on understanding just as movement through space has a dilating effect on time? Returning

to Figure 1.3 from Chapter 1 (immediately below), one can envision BPSS as crosscutting the parameter space, shown in Figure 6.2.

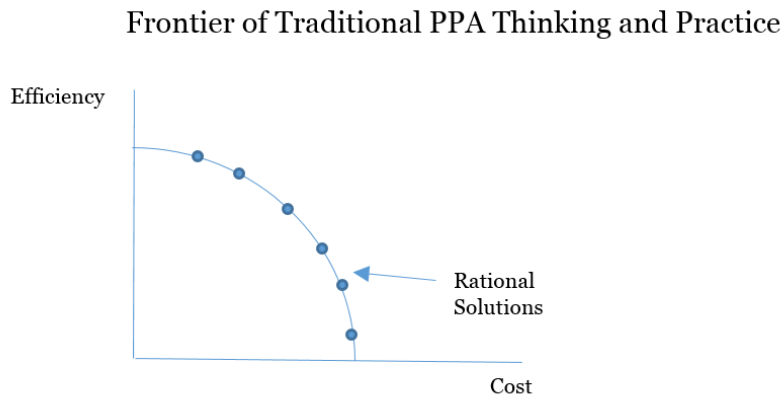
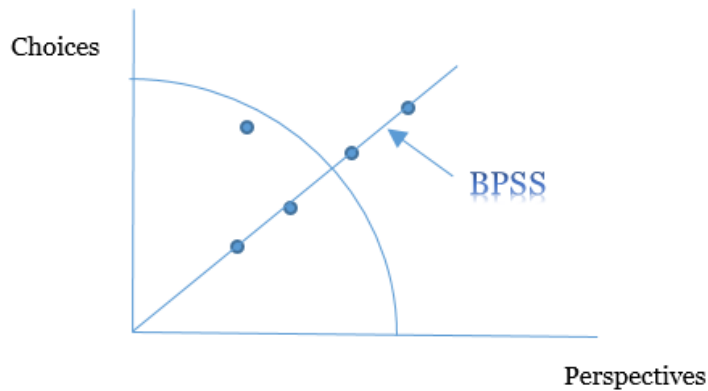
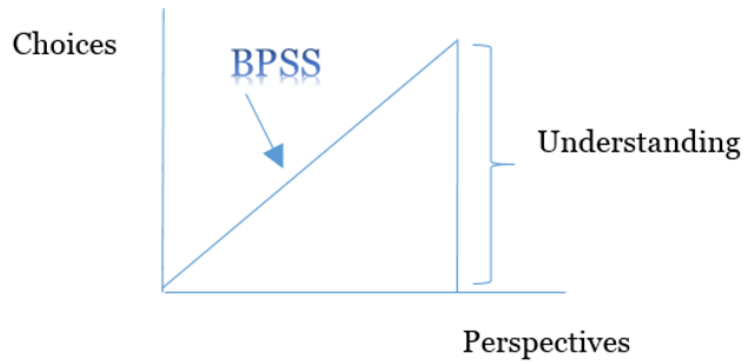


Figure 6.2 New Frontier of EP-Inspired PPA Thinking and Practice



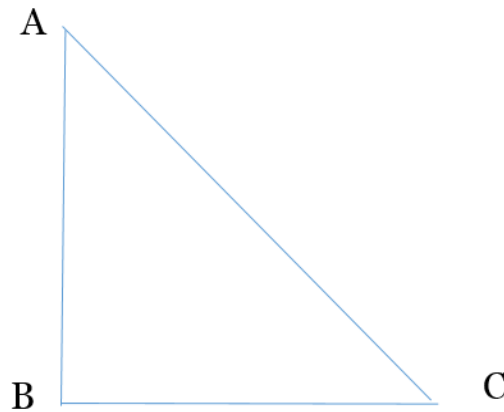
Now, possibilities can occur anywhere in the parameter space. The space takes on three dimensions: In addition to perspectives and choices, the third dimension, the dimension expressly related to epistemic pluralism is added to the space. Returning to Figure 1.4 from Chapter 1, shown in Figure 6.3, we see that EP expands understanding.

Figure 6.3 Expanded Understanding through Multiple Perspectives



As shown in Figure 6.3, when the number of perspectives increases, the result is greater understanding. We can see this through visual inspection of the figure. We can also demonstrate it mathematically using the Pythagorean Theorem. The Pythagorean Theorem was also used to demonstrate the concept of time dilation in general relativity.

Using the triangle above, we have:



The Pythagorean Theorem is that $AB^2 + BC^2 = AC^2$. Therefore, $AB^2 = AC^2 - BC^2$.

According to Stannard (2008), with the following substitutions, it can be demonstrated that t' is always greater than t . Time dilates. We assume c is a constant, t is time, and v is velocity.

$$AB = ct', AC = ct, BC = vt$$

Stannard (2008) shows:

$$(ct')^2 = (ct)^2 - (vt)^2 =$$

$$c^2t'^2 = c^2t^2 - v^2t^2 =$$

$$c^2t'^2 = (c^2 - v^2)t^2 =$$

$$t'^2 = \left(1 - \frac{v^2}{c^2}\right)t^2 =$$

$$t' = t \sqrt{\left(1 - \frac{v^2}{c^2}\right)} =$$

$$t' > t$$

One future direction of study will be to show mathematically that perspectives dilate understanding. If understanding is substituted for time and EP is substituted for t' , it may be demonstrated that understanding dilates. New understandings emerge from using EP as either theory or practice, or both theory and practice. A theoretical physics approach to EP has been characterized as the Holy Grail (Farmer, 2005). Future research should investigate this line of inquiry.

This dissertation contributed to understandings about method, understandings about substance, and understandings about method and substance. In terms of understandings about method, this dissertation: 1) utilized a hermeneutic approach that incorporated the language of mathematics, 2) found that study terms are held together by a Wittgensteinian Family Resemblance, 3) showed that quantitative text analysis may lose context-sensitivity, 4) demonstrated the complexity of agent-based modeling, 5) suggested that complexity science should work to avoid the gravitational pull of

specialization, and 6) extended epistemic pluralism to the cloud with Variable Level Policy Modeling. Understandings about substance included: 1) a mathematical demonstration that epistemic pluralism expands understanding, and 2) the finding that big data is a language-game. It is the use of big data, the activity of big data, which “defines” it. The central contribution to understandings of both method and substance is the illustration of big data as a language-game through the language of mathematics, computational modeling, and theoretical physics.

Viewing issues through multiple perspectives expands understanding by extending PPA decision-making from a one-best-choice optimization problem, viewed through rationality, to a problem with multiple optimal solutions depending on the perspective used. Epistemic pluralism is viewed as the way to get from A, the one-best-choice, to Z, multiple choices. Expanded understanding was demonstrated mathematically using calculus. Epistemic pluralism was also discussed as having roots in language-games as theorized by Ludwig Wittgenstein, and multiple components. One such component examined was the BPSS model. In the so-called DNA of epistemic pluralism, BPSS, is a part. Other parts of epistemic pluralism include imagination, deconstruction, deterritorialization, and alterity. These were examined in their big data context and implications for public policy and administration were discussed. The complexity of epistemic pluralism extends to the cloud where new, creative ways of solving public policy problems are emergent and based on mutual adaptation. Finally, epistemic pluralism was proposed as the analogue to time dilation in theoretical physics. Whereas time is shown to actually expand in time dilation, epistemic pluralism can also expand understanding of PPA problems. This dissertation showed that epistemic

pluralism provides a valuable link between theory and theory, theory and practice, and practice and practice.

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